ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES

8(2)
2020

Volume 8　　　　　Number 2　　　　　December 2020

ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES

2020
8(2)

Areas of research include, but are not limited to, the following:

- Areas of research include, but are not limited to, the following:
- Conceptual/Practical Approaches and Methodologies towards Sustainable Entrepreneurship
- Globalization, Internationalization and Solutions for Low-Carbon Economies of Scope or Scale
- Innovations and Technology Transfer Pilot Results Advancing Entrepreneurship and Sustainability
- Information Technologies (IT) and Information Communication Technologies (ICT) for Entrepreneurship Sustainability, and Socio-Economic Innovations
- Environmental Engineering for Sustainability and Entrepreneurial Applications/Ventures
- Smart Electricity Grid Solutions for Sustainable Entrepreneurship
- Implementation of Renewable Energies (e.g. Harvesting, Storage, New Technologies Being Deployed/Developed, Innovative Market or Business Model Paradigms, etc.)
- Entrepreneurship, Security and Safety
- Sustainable Development, Entrepreneurship, Safety
- Threats to Society, Entrepreneurship and Regional Development
- Security and Safety of Countries, Regions and Society as Precondition of Sustainable Development and Sustainable Entrepreneurship
- Boarder Guard Issues. Regional Development and Entrepreneurship
- Migration and Sustainable Regional Development and Entrepreneurship
- Terrorism, International Crime, Regional Development and Sustainability
- Security and Safety Models for Sustainable Development of Societies and Businesses
- Emerging Business Drivers, Opportunities, or Constraints in Future Sectors of Current Markets
- Retrofitting Techniques and Technologies Near-Zero Energy Demand Buildings
- Urban Planning and Advanced Construction Materials for Energy-Efficiency or Smart Cities
- Modern Economics in the Context of Security, Comfort, or Legislation
- PPPs for Developments in Sustainable Entrepreneurship, Finance, and Investments
- Accounting and Entrepreneurship Issues
- Sustainable Entrepreneurship in the Context of Management or Life-Long Learning
- Strategic Management Practices and Creative Marketing Techniques for Sustainability
- Organizational Studies and Sustainable Entrepreneurship
- Entrepreneurship in the Context of Marketing, ICT, and Creative Industries
- Intercultural Communication for Sustainable Entrepreneurship
- Institutions and Entrepreneurship
- Case Studies on Entrepreneurship and Sustainable Development
- Social Cohesion and Social Innovation and Social Entrepreneurship
- Business Models and Strategic Management for Sustainable, Secure and Safe Futures
- Corporate Social Responsibility and Sustainable Development
- Entrepreneurship in the Context of Psychology, Education, or Women
- Intuitions about Emerging Phenomena in Business and Society
- Start-Ups, Spin-Offs, SMEs in the Context of Market Growth And Exit
- Global Value Chain Management for Sustainable Entrepreneurship
- Knowledge Management for Sustainable Entrepreneurship, Safety and Security

All papers published in the *Entrepreneurship and Sustainability Issues* are indexed/abstracted by:

Web of Science

Clarivate Analytics

Scopus - **Coverage starting with 2017 material, Q1**

- ECONIS of the ZBW – Leibniz Information Centre for Economics   *http://www.zbw.eu/EconBiz*
- RePEc   *http://repec.org/EconBiz*
- Ulrich's Periodicals Directory
  Serials Solutions   *http://www.serialssolutions.com/*

- ProQuest business   *http://www.proquest.co.uk/en-UK/*

- Crossref
- Google Scholar
- The European Library   *http://www.theeuropeanlibrary.org*
- Database Lituanistika   *http://www.lituanistikadb.lt*
- Index Copernicus International

Volume 8 Number 2 December 2020

CONTENTS

STRATEGIC REACTIONS TO INFORMATION CONTENT OF DIVIDEND CHANGE: APPLYING BCG GROWTH SHARE MATRIX WHEN SIGNALLING HYPOTHESIS IDENTIFIED

**Alireza Aghaee Shahrbabaki [1] , Saeed Sakkaki [2], Peyman Parsa [3],
Mohammad Saeed Heidary [4] , Vahid Yousefi Pour [5]**

[1]Bocconi University, Department of Finance, via Roentgen 1, 20136 Milan and SDA Bocconi School of Management, Milan, Italy

[2, 5] Graduate School of Management and Economics, Sharif University of Technology, Azadi st. P.O.Box 1458889694, Tehran, Iran

[3]Department of Industrial Enginerring, K.N. Toosi University of Technology, No. 19, Pardis Street, Molla Sadra Ave., Vanak Sq., P.O. Box 1999143344, Tehran, Iran

[4]Department of finance, Faculty of Management and Accounting, Allameh Tabataba'i University, West End Hemmat Highway, Dehkadeh-ye-Olympic, 1489684511, Tehran, Iran

E-mail: [1]alireza.aghaee@phd.unibocconi.it （Corresponding author)*

Abstract. The signaling hypothesis has been vastly under investigation for many years. There are two attitudes towards this phenomenon; some believe that firms increase (decrease) their dividend to signal about the future increases in earnings due to asymmetric information that managers have. Adversely, others believe that firms usually increase their dividends when they do not have further lucrative projects with positive net present values. Although there is a lot of empirical testing about this hypothesis that has been placed, there is no investigation about agency costs and cheating potential signaling hypothesis can provide for managers to cheat shareowners and market if it happens in the stock market. Through this article, we will test the signaling hypothesis for the firms listed in Tehran Stock Exchange, a rather volatile emerging market. We concluded that while dividend increases have no significant information content about future earnings, dividend decreases have meaningful information content about decreasing earning in the future. We use different scenarios that managers can react if the signaling hypothesis occurs and analyze the agency cost these scenarios bear on shareowners.

Keywords: dividend policy; signaling theory; Agency cost; BCG matrix

1. Introduction

Dividend signaling theory states that managers use dividend changes to signal asymmetric information about the future profitability of the company, it seems that a study of changes in dividends and future profitability in the corporate finance field is a subject worth to be considered and discussed (Baker 2017). Probing the managers' perspective to dividend-paying, their purpose of it, and the issues they consider in dividend decisions, has long been a heated debate between scholars in the financial literature. For instance Smith (2017) analyses it in earning management context and James (2015) discover whether signaling theory and dividend paying increase social responsibility. In every financial market, whether in developed countries or emerging ones, why, how, and to what extent capital returns to investors is of great importance. On the other hand, the ability to transfer surplus values to productive investment opportunities is one of the crucial factors of economic growth. Although there are different works about testing signling theory, but research in developing markets, is not get to a conclusive stage (Abdulla 2016, Aivazian 2003).

In literature, three major methods are used to test this particular category of assumptions. The first method is to examine whether and how dividend changes can predict changes in future stock price. The second method tests whether and how dividend changes can predict the future accounting profitability of the firms. Specifically, with these two methods, if the assumptions are statistically accepted, it is claimed that companies use dividend changes as a harbinger of their future profitability. The third method, which is much less used and presumably has less power to corroborate or reject the hypothesis, is interviewing with corporate executives and financial officers and asking them about this approach to use dividend changes in order to signal about future earnings (Brav 2005, Baker 2002, Baker 2017).

One of the issues related to the signaling theory is to examine the relationship between dividend changes and future profitability changes. In fact, since managers' expectations of future profitability can be effective in firms' dividend-paying decisions, dividend changes, due to changes in the company's capital structure, can affect future profitability. Therefore, a robust and detailed econometric method is needed to investigate this endogenous relationship between dividend changes and profitability changes for a more accurate test of signaling theory.The first motive for this study is to investigate this endogenous relationship between dividend changes and future profitability changes, and this is done using a simultaneous equation method to control other effective variables. Another important issue is that this study is testing the theory in the emerging market of Iran. Literature has shown that in developing countries, it is necessary to think about certain considerations in the application of conventional financial theories. This happens for the higher risk of credit in both firms and countries, the existence of specific rules and laws for each country, the inability in using many common financial instruments (for example no existence of short selling in many countries' security market), the size of the capital market in comparison to the total assets, etc. (Booth, Aivazian, Demirguc-Kunt, Maksimovic (2001), Aivazian, Booth, Cleary (2003)). Here, we used the financial data of firms listed in Tehran Stock Exchange.

So far, many empirical findings of the impact of dividends on earnings have been inconclusive, in the sense that they have not led to a comprehensive conclusion; moreover, most of these studies have focused on developed countries such as the USA and UK. While there are limited researches of these kinds in developing markets, few studies have tried to research on the dividend determinants. Researches such as Adelegan (2003) in Nigeria, Ahmed and Attiya (2009), and Afza and Mirza (2010) in Pakistan, Al-yahyaee et al. (2006) in Oman and Al-Najjar (2009) in Jordan, and Baker et al. (2019) in Sri Lankan have been conducted on the factors affecting the dividend policy.

Other studies have also been carried out particularly to test the signaling hypothesis; other studies have also been carried out particularly to test the signaling hypothesis; again the results of these researches are

inconsistent with each other; this phenomenon is known as dividend puzzling which implies that there is no general rule for different markets. For example, studies in emerging markets by Lukose and Rao (2010) in India, Berezinets et al. (2018) in India, Chaudhary et al. (2016) in Pakistan, Travlos, Trigeorgis, and Vafeas (2001) in Egypt and Dasilas (2007) in Greek stock market, approved the truthfulness of the signaling hypothesis. Whereas studies by Berezinets et al. (2018) in Russia, Al Quadeh et al. (2015) in Saudi Arabia, Kadıoğlu and Öcal (2016) in Turkey, and Lotfi (2018) in the Tunisia stock market are inconsistent with the signaling hypothesis. In Iran, Talaneh (1991), Talaneh and Shemirani (2011), Khoshtinat and Hajian (2008), Ardekani et al. (2010), and Keshavarz et al. (2014) have conducted researches on the dividend policy, but these studies did not test the information content of dividend changes on future earnings.

Our first contribution is testing signaling hypothesis in one of developing countries, Iran. So we examine real data by using the information content of dividend announcements and its changes in the companies that are listed on the Tehran Stock Exchange during the period from 2001 to 2017 in Iran, a developing country. Due to limited access to data as well as incomplete and unstructured data, few studies have been conducted on dividend income in Iran. In this study, data were gathered in a variety of ways such as web page crawling. Finally, we put them in a structured, complete, and accurate manner in files to serve to analyze the research question in a wider domain and with much less error than similar local studies. Another contribution of this study is to take inflation as independent variable explaining some systematic changes in dividends and earnings. Iran, like many other developing countries, has suffered a high inflation rate over the recent decade. Therefore, with the inflation ranging from 14% to 30% per year, a hypothetical 20% increase in dividend may be justified barely by taking the effect of inflation into account. Hence, we considered inflation in our model as a meaningful factor to explain the changes in dividends and earnings. Furthermore, our last contribution is about how managers could react to the signaling potential of a dividend increase and decrease using the BCG growth-share matrix. Henderson (1979) developed the BCG matrix for analyzing various firms in corporate business portfolio. In current years, there is a new stream of research on how to apply the BCG matrix in different management issues. Smith (2002) applied the BCG matrix in customer profitability analysis and Widiatama et al. (2018) exploit the growth-share matrix in the market optimization era. We use the BCG growth-share matrix to predict the reaction of managers and different strategies they can take to communicate the stock market when they identified the signaling hypothesis is working.

The rest of this article is organized as follows. The second section reviews the literature for developed and developing markets, which ultimately finds a research gap in literature from the perspective of new source of data in emerging market, Iran. In addition, we find that how to react to the signaling hypothesis is one of the main issues managers would react to dividend strategy selection. The third section describes the data and measurement criteria. The fourth section presents the model used to analyze the data. The fifth section explains the findings of the tests, and the sixth section concludes the paper.

2. Literature review

Miller and Modigliani (1961) showed that with the assumption of several conditions, including the absence of taxes, transaction costs, and market imperfections, the market value of a company is entirely independent of its dividend policy. They came to the conclusion that the company's profitability and its investments are only factors affecting the firm's market value and stock price; the result of this study is called the dividend irrelevance hypothesis. Many theories after Miller and Modigliani have tried to show that dividend policy is important in future profitability. The main objection to Miller and Modigliani's theory is that this study is based on an efficient market. In other words, in an imperfect market, dividend policy can have an important effect on market value and future profitability.

One of the most critical issues in corporate finance is whether and how dividend changes contain information about future profitability. Although dividend signaling theories suggest that dividend increases signal more lucrative prospects (Bhattcharya 1979, Miller & Rock 1985), many empirical studies have failed to support this argument; for example, studies by Watts (1973), Penman (1983), DeAngelo et al. (1996), Benartzi et al. (1997), Grullon et al. (2002) have observed no or negligible evidence that dividend changes can predict future abnormal earnings. Also, some studies based on surveys and interviews from hundreds of financial managers have shown that managers deny the thought that dividends are used as a signaling device (Brav et al. 2005).

By reviewing literature, even with the assumption that the profitability of a stock is directly and positively correlated with the dividend increase announcements, whether the managers change dividends to signal the prospect of their firms cannot be tested with existing methodologies. In fact, it is possible for an investor to reasonably or unreasonably concludes that managers mostly use dividend changes as signals, which means that investors react positively (negatively) to dividend increases (decreases). While managers may have made this change for some other reasons (like investing for future growth). In addition, Watts (1973), Penman (1983), DeAngelo et al. 1996, Benartzi et al. (1997), Nissim and Ziv (2001), Grullon et al. (2002), Grullon et al. (2005), Brav et al. (2005), Denis and Osobov (2008), and others examined that dividend changes, instead of future stock returns, could predict subsequent accounting earnings. In short, no matter what the motive for dividend change is, what is noteworthy is that distributing dividends by itself may be effective in future profits.

In spite of some previous studies that imply a short span timing of information that dividend changes convey about future income, Increasing dividends by mangers are more likely when they predict a persistent increase in prospect earnings(Ham et al. 2019). According to this paradoxical results in the literature, a study by Kaplan and Perez(2019) shows changes in dividend payout should not be considered as a signaling tool, rather it's more aligned with the standard capital structure models. For example, Managers decide to pay out excess cash to shareholders when there are no investment opportunities.Considering dividend changes, since dividend increases reduce the amount of budget ready for newer investments, companies may lose potential investment opportunities with a positive net present value (NPV), or they will be forced to finance projects at a higher cost, while in either case, it may lead to a reduction in future profits. Also, in the Gordon (1962) model, it has been shown that in a stock portfolio with constant long-term expected returns, high dividend payouts will be offset by low expected earnings growth. In contrast, the agency theory (Jensen 1986; Jensen & Meckling, 1976) has a different view on dividend payouts. It is explained in the agency theory that due to the possibility of allocating resources to the activities that the managers themselves benefit from the most, increasing dividends can reduce the potential cost related to the agency problems. Meanwhile, corporate dividend payments are more closely monitored by the capital market as firms will visit the capital market with more frequency to meet their financing needs. This continuous monitoring by the capital market will not let managers deviate too much from the main guidelines that investors have in mind.

In an environment with asymmetric information, the dividend announcements and its changes have the potential to transfer internal managers' information to the outside. (Battacharya 1979, John & Williams 1985, Miller & Rock 1985). The assumption of signaling has been extensively tested in developed markets, and the results indicate that stock prices have a positive reaction to increase in dividends and negative reactions to decrease in dividends (Aharony et al. 1988, Borde et al. 1999, Eades et al. 1985, Impson 1997). Especially, Lukose, J., and Rao, S. (2010), investigated the theory of signaling in the Indian stock market and showed that dividend initiation has a much greater effect on the share prices than the increase in the dividend payout ratio.

Studies about the dividend signaling hypothesis generally track two different routes. One strategy has been to apply econometric methods to test the theories that are extant in the literature, and another has been to use the surveys filled by corporate executives about what the key dividend policy determinants are. Taking all the

reviewed theories in mind, one cannot imagine a unique direct impact of dividend changes on future profits, and it should be seen that excavating the data confirms which of the claims in this area.

In short, by excluding dividend change incentives, dividend-paying by itself can be effective in future profitability due to the change in the capital structure. Healy and Palepu (1988) indicated that firms that initiate (omit) dividends realize a significant increase (decrease) in their earnings for at least one year before and the year of dividend change. Similarly, these companies will have a significant increase or decrease in their profitability at least one year after the announcement. Benartzi et al. (1997) used a sample matching approach, in which firms that change dividends are matched with those that do not change dividend based on characteristics such as industry, past performance, and capital structure. Controlling for the earnings pattern and mean reversion, they found that there is no evidence to confirm that unexpected positive change in profitability (earning) occurs after dividend increases.

In contrast to these findings, Nissim and Ziv (2001) claimed that studies such as Benartzi were invalid due to the measurement error in the dependent variable and the problem with the omitted correlated variables. They assumed that current earnings were affected by the first-degree autocorrelation; after considering these problems and the arrangements for them, they found that positive dividend changes are related to changes in earnings for two years after the announcement. Their findings were remarkable because their predecessors who had used regression method reported an adverse result (Penman 1983), or did not find any relationship or found a very weak relationship. Pursuing a similar logic to that of Nissim and Ziv, Harada and Nguyen (2005) argued that the dispersion of the managers' motivation to set dividends might cause dividend change data to act in contrast to the signaling hypothesis.

In order to understand the potential nonlinear relationship between dividends and revenues, many of the former researchers incorporated methods other than ordinary linear regression analysis and reported different results from what Nissim and Ziv found. For example, DeAngelo et al. (1996) examined the dividend policy at times when company revenues were unexpectedly declining and concluded that dividend changes have almost no information about future changes in earnings. Similar results were also reported for the study of Grullon et al. (2002), and authors strongly rejected the claim of dividend signaling. Indeed, consistent findings in different studies with different methods, and often, in contrast to that of Nissim and Ziv, have raised the question of why companies pay dividends.

More recently, Lukose and Rao (2010) examined the stock price reaction to dividend changes and also the relevance of the signaling models in explaining the effects of dividend changes on the valuation of Indian industrial companies. This study analyzed the effect of dividend changes on corporate value, its impact on future profitability, and market response to dividend changes. They noticed the significant wealth effect around dividend changes during the year of changes, and it has been concluded that dividend changes have a significant and meaningful effect on the company's stock value and profitability in the same, but it will not be meaningful in the following years. Particularly, the initiation of dividend paying has a much greater effect than an increase in the payout on increasing the stock prices. Similarly, Liu and Chen (2015) tried to test the dividend signaling hypothesis as to whether managers change dividend profits to signal their expectations of profitability using the simultaneous equation and the data of US companies. Their results showed that managers change dividends to signal equity-scaled rather than asset-scaled earnings prospects. Also, they found evidence that managers change dividends to signal previous earnings changes.

So far, most studies have been concerned with developed markets. In emerging and developing countries we can find a study in Cairo has been carried out by Travlos et al. (2001), which examines the market response to increasing dividends and stock dividends and found that both cases have a significant positive effect on stock returns. In another emerging market, Dasilas (2007) has also seen significant market responses on dividend

changes in the Athens Stock Exchange. The study, conducted in Greece, examines the market reaction (price effect and volume of trades) to dividend payout announcements by companies. The article states that the structure of the Athens stock market has the following structural differences with other large stock markets. First, dividends in Greece are paid annually rather than quarterly or semi-annually. Second, the Greek corporate laws designate an accurate minimum amount for distribution from the taxed corporate profits. Third, neither tax on dividends nor capital gains is imposed. Fourth, the Greek listed firms are characterized by high ownership concentration where major owners are usually involved in the management and have, therefore, less need for dividend announcements as an information source. Despite all these differences, especially the absence of tax, circumstances seem to be very close to that of Miller and Modigliani dividend irrelevance theory, but this study demonstrates that the dividend announcement has a significant impact on stock prices and future earnings of companies in Greece, which well supports the signaling theory, and highlights the importance of further investigations.Zhao (2016) confirmed the signaling hypothesis by testing the relationship between dividend changes and corporate bond responses. Dividend increase(decrease) leads to a significant increase(decrease) in bond yield. Chaudhary et al. (2016) confirmed the signaling hypothesis by examining the Pakistan stock market reaction to dividend change. Liaqat et al. (2019) have researched the managerial perception about the signaling effect of dividend policy in Pakistan stock exchange as an emerging market. Their study indicates that current earning, past dividends, liquidity, taxation, managerial perspective, investor perception, and share prices have considerable influence on dividend policy. Furthermore, they concluded that the previous year dividend payout has not (or has a weak) effect on the estimation of the current year dividend payout. The other finding of this research is that continuing payout of the dividend could be considered as management performance and convey a positive signal to the market.

Lotfi (2018) shows the Tunisia stock market didn't approve truthfulness of the information content of dividend policy, but when there is a decrease in dividend payout, Lotfi(2018) reports a negative reaction by Tunisia stock market to the announcement of dividend policy.Another study has been conducted in the kingdom of Saudi Arabia stock market (Tadawul) by Al Quadeh et al. (2015). According to their conclusion, there is no significant market reaction to dividend announcements. Thus we could not generalize signaling theory to all kinds of markets. This study enlists the limitations and characteristics of KSA market and emphasizes that limitations of emerging markets have a significant effect on the feasibility of the signaling theory. A study by Kadıoğlu and Öcal (2016) in the Turkish stock market reported that there is no significant effect of dividend announcement on stock price, but they found a significant correlation between the increase in stock prices and with the profitability of previous year. A similar study conducted by Tran and Mai (2015) in the Vietnamese stock market; found that different kinds of dividend announcements (increase, decrease, and no change) have a positive effect on stock prices. Berezinets et al. (2018) found a similar result by analysis of Russia stock market during economic growth, in other words, they report a negative reaction to both increase and decrease in dividend policy, but their result for India stock market during economics growth is consistent with signaling theory. The reaction of both Russia and India markets to decrease in dividend are more considerable than to increase in the dividend.

Using regression analysis for causal inference, Tao et al. (2016) investigated the signaling hypothesis in China stock market under a distinctive and special rule called by authors **"**a semi-mandatory dividend policy**"**,   that forces firms to pay a minimum level of dividends to be allowed to do seasoned equity offering (SEO). They found a significant and meaningful positive relationship between an increase in dividend policy and future return for non-SEO firms, but for SEO firms there wasn't such a significant relationship, hence the SEO firms' result is inconsistent with the signaling hypothesis. According to such results, we should emphasize the distinctive behavior of different markets and different categories of stocks in each market. As another example, the effect of a firm's characteristics on signaling behavior is investigated by Gupta and Aggarwal(2018). By analysis of the Indian stock market in three-segment, they found that only mid-cap stocks confirm signaling effect when dividends increase, whereas a change in dividends of small and large-cap stocks didn't affect post-event behavior of the market. Some mix reaction also report in developed and developing market.Literature implies that this is

not necessary to see similar reactions by the market to dividend change announcement and dividend initiation announcement. For example, by examining stocks in CSRP(the Center for Research in Security Prices) dataset during 1990-2009, Smith and Pennathur (2017) found that dividend increase approves the signaling hypothesis, but dividend initiation effect doesn't support signaling. Rabbani (2017) found a difference between the effect of a dividend increase and a dividend decrease on the market reaction of Bangladesh stock market; whereas dividend decrease supports the signaling hypothesis, dividend increase does not approve it.Nam (2018) researched the role of R&D on the dividend decision of loss firms; her results support the signaling hypothesis for loss firms with high R&D activity in South Korea.

Although there are different studies in both developing and developed market but analyzing signaling hypothesis when there is tough economic condition is rarely investigated. A recent study by Khanal and Mishra (2017) focused on the reaction of the market to the dividend announcement in USA markets during the 2006-2012 period which referred to as a "sluggish economic period" by authors. They reported consistency with signaling theory in their findings during this period like previous researches on USA markets, but they underscore the considerable difference in the magnitude of the reactions, about 1.81% abnormal return in 2006-2012 period compared to 5.9 % results of previous research on the identical dataset when economy underwent high inflation and tax reform in 1980s.Gafoor et al. (2014) in their research findings indicate that there is a positive relationship between inflation and dividend payment policy. After consideration of the result of this study, along with findings of other similar researches in emerging markets (Baker et al. 2018), it should be emphasized on the importance of inflation impact when dealing with dividend decision issues (Baker and Jabbouri 2016, 2017).In this regard, Basse (2019) by controlling inflation, reinvestigate the dividend decisions of insurance companies of the Euro Stoxx stock market.

To date, a limited investigation about the impact of dividend policy on future profitability has been performed based on Iranian companies. In general, research on the financial market and securities of Iran has suffered too much generalization or other scientific problems due to the lack of access to high quality and structured data. In other words, data limitations are one of the essential factors leading to simplified models and entering analysis errors that directly affect the accuracy, validity, and reliability of the results of previous researches in Iran. In the present paper evaluate the information content of dividend changes in companies listed on the Tehran Stock Exchange during the period from 2001 to 2017. Having accessed, prepared, and aggregated the relevant non-structured and incomplete data, we are able to analyze the research question in a wider domain, with a more accurate analysis model, and much less error than former local investigations.

In addition, literature shows that there is no research on how managers could react to the signaling potential of dividends and what strategies they would take in different conditions. Furthermore, one can easily found cheating potentials when the signaling hypothesis happens in either direction. The main contribution of this research is to identify those potentials in different scenarios using the BCG matrix and clarify the state of each business when signaling potential happen. This would help shareholders to minimize their risk of having each share when the signaling hypothesis happen.

3. Data and measurements

Data gathering was the most significant milestone of this study. The data we needed to perform the tests was as follows (from 2001 to 2017, beginning and end of years are matched with the Persian calendar):
Aggregated data of dividends paid to stockholders;
Earnings per share for all stocks listed on TSE for all or a part of the time interval;
Adjusted close price of all stocks listed on TSE for all or a part of the time interval;

Aggregated data of Book value per share for all stocks in all of the years that firm is listed on TSE within the interval;
Some of the financial ratios of all firms listed on TSE in all or part of the time interval.

Since most of the data above were not neatly extant in any accessible database as a whole, and the others were only accessible only for a part of companies, we finally gathered the required data with a combination of web crawling and programmed robots (Octoparse, developed by Selenium) in conjunction with TSE client software.
Because the data were collected with different methods and from different databases, they needed to be integrated so that the necessary information for analysis would be structurally available. The process of cleaning and preparing collected data was arranged using Python programming to prepare the final data frames and making data ready for analysis.

Table 1 provides a descriptive view of dividend change frequency in TSE. Each column declares the number of records in that year for each of the dividend event types: increase, no change, and decrease. In this table, even a one IRR increase or decrease in dividends is considered as a change. According to Table 1, the dispersion of the dividend changes in the TSE is quite frequent.

4. Methodology and Analysis

4.1. Core concept and main process

In this research, we follow four steps in analyzing the signaling hypothesis and strategy reactions of a manager. Figure one shows this process for analyzing and predicting management behavior to signaling hypothesis when it is identified in the market. First, we determine whether the signaling hypothesis happens or not. In step two, we calculate the amount of dividend concerning all factors except for signaling hypothesis such as competition and so on. In step three, we find the position of the firm in the BCG growth-share matrix. This helps to understand the status of the firm in the market. In step four, we select the strategy to communicate the market considering the signaling hypothesis.
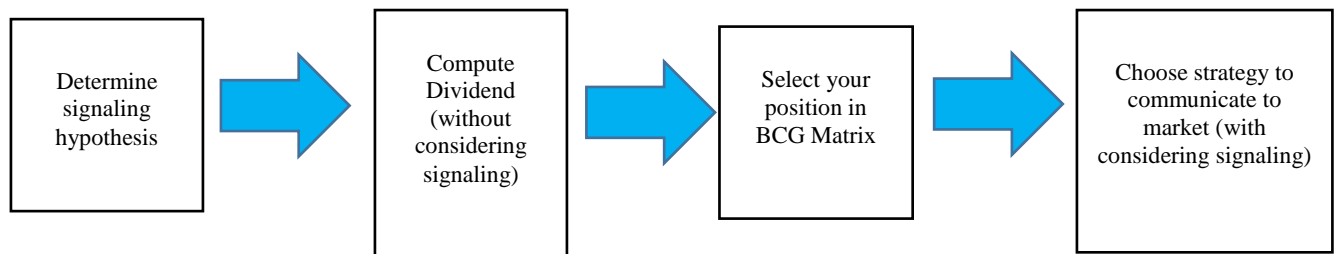
Figure 1. The process of applying signaling hypothesis to the firm

4.2. Determining signalling hypothesis

For selecting the best strategy to react to the market by managers, First, we need to identify whether the signaling hypothesis is happen or not in a specific market. We want to uncover this hypothesis in one of the main emerging markets, Iran. Considering figure 1 for the main methodology that this paper is based on, this can be used in all markets and it is not limited to the example we go through. In this part, we mostly followed the methodology used in Nissim and Ziv (2001). We first start with more simple models, which actually may lead to erroneous results. Then we discuss the faults of these models and try to solve them to propose the final model.

Table 1. Statistic description of dividend events

Year	Div-Inc	Div_No Change	Div-Dec	Total Div Events
2001-2002	119	17	86	222
2002-2003	97	14	127	238
2003-2004	160	25	107	292
2004-2005	137	31	127	295
2005-2006	155	86	127	368
2006-2007	150	73	147	370
2007-2008	167	81	132	380
2008-2009	146	63	139	348
2009-2010	147	74	126	347
2010-2011	175	91	121	387
2011-2012	222	108	132	462
2012-2013	259	98	127	484
2013-2014	310	95	126	531
2014-2015	194	108	258	560
2015-2016	157	134	301	592
2016-2017	177	149	245	571
Total	2772	1247	2428	6447

The first method, assuming that the earnings follow a random walk process with a specific drift, uses a simple method like that of Benartzi (1997). In this model, the dependent variable is the changes in annual earnings deflated with price, and the rate of annual dividend changes is used as the independent variable. Specifically here, the relationship between dividend income change in year zero and the change in earnings in years zero, one, and two (deflated with the price at the beginning of the fiscal year of dividend distribution) is investigated, and the research question hypothesis will be tested. Therefore we regress the following equation for $\tau = 0$, 1, and 2.

$$\frac{E_\tau - E_{\tau-1}}{P_{-1}} = \alpha_0 + \alpha_1 R\Delta DIV_0 + \varepsilon_\tau \qquad (1)$$

In this equation, E_τ denotes earnings in year τ, P_{-1} is the stock price at the beginning of the dividend change year, and $R\Delta DIV_0$ is the rate of change in dividend per share in the year zero.

Table 2 has the results of this pooled OLS. The first row reports the coefficient and the second row reports t-statistic.

Conforming to Benartzi (1997), α_1 is positive and highly significant for $\tau = 0$, and it is not significant for $\tau = 2$, but, contrary to their findings, it is also significant for $\tau = 1$.

Table 2. Result of Model (1)

$\dfrac{E_\tau - E_{\tau-1}}{P_{-1}} = \alpha_0 + \alpha_1 R\Delta DIV_0 + \varepsilon_\tau$				
τ	α_0	α_1	R^2	N
0	-0.0146	0.0211	0.028	4639
	-2.253	11.469		
1	0.0015	-0.005	0.002	4479
	0.236	-2.769		
2	-0.0099	-0.0028	0.001	3957
	-1.495	-1.49		

Nissim and Ziv vastly argue that this simple model has ample faults. Firstly, it may have a measurement error in the dependent variable. The change in the earnings in equation (1) is deflated by price at the beginning of dividend change year (P_{-1}). Since price is reflecting stockholders' future predictions itself, abnormal positive (negative) change in earnings will indicate itself in rising (falling) prices. Therefore, the nominator and denominator of the independent variable in equation (1) are positively related to each other, and this measurement error may cause α_1 to be biased against finding information content in dividends. Thus, we exchanged the P_{-1} in this equation with B_{-1}, the book value of equity per share, which has no or little information about future earning changes as it changes once a year in Iran in most cases. Secondly, the assumption of earnings following a random walk pattern implies that the expected change in earnings may be zero (or constant if there is a drift). Nevertheless, in the presence of additional information about the company, this assumption may not hold anymore. Ohlson and Penman (1982) showed that ROE is an important predictor of changes in earnings. Based on their findings, ROE is mean reverting, which implies that low (high) earnings will follow high (low) levels of ROE. Hence, predicted changes in earning are negatively correlated with ROE. In order to solve the problem of this omitted correlated variable, ROE of the year $\tau - 1$ has been added to the model as an independent regressor, and the following equation will be used for $\tau = 0$ and 1.

$$\frac{E_\tau - E_{\tau-1}}{B_{-1}} = \alpha_0 + \alpha_1 R\Delta DIV_0 + \alpha_2 ROE_{\tau-1} + \varepsilon_\tau \quad (2)$$

In this panel data, to address the problem of heteroscedasticity and autocorrelation in residuals, we incorporated the Fama-Macbeth two-step regression procedure.

We know that dividend changes are highly correlated with the contemporary (same year) earning changes. Therefore, if we had autocorrelation in earning change series, we would see significant relations between dividend changes and earning changes in subsequent years. In this regard, we added $\frac{E_0 - E_{-1}}{B_{-1}}$ to the equation as a control variable to address this issue. Furthermore, it seems reasonable that the results about the information content of dividend changes may be asymmetric for dividend increases and decreases. Therefore, we add two binary dummy variables to separate the effect of these two events from each other, and we reach the following model for $\tau = 0$ and 1.

$$\frac{E_\tau - E_{\tau-1}}{B_{-1}} = \alpha_0 + \alpha_{1p} DPC_0.R\Delta DIV_0 + \alpha_{1n} DNC_0.R\Delta DIV_0 + \alpha_2 ROE_{\tau-1} + \alpha_3 \frac{E_0 - E_{-1}}{B_{-1}} + \varepsilon_\tau \quad (3)$$

In table 3, which will be provided further, we have the results of pooled and cross-sectional OLS regressions of models (2) and (3) including t-statistic for each coefficient and proportion of positive coefficients in each cross-sectional regression. In the analysis of cross-sectional regressions, we have used Fama-Macbeth method.

According to the results (Table3), none of the coefficients in model 2 is statistically significant, meaning that, based on this model, in the Iranian stock market, the dividend change rate, as well as the ROE, provides no useful information about changes in earnings (adjusted to book value) in the coming years. The reason for this observation can be the homogeneity of the book value of equity in the Iranian market, which extracts out the explanatory power from these variables. Particularly, because of the high inflation that exists in Iran, usually after a few years, the book value of equity per share will be completely irrelevant to the real value of equity since firms usually do not revise their capital in their balance sheet regularly. It should be noted, however, in the cross-sectional analysis, it was observed that these coefficients were statistically significant in some of the years while not in aggregation.

Table 3. Result from Model (2) and Model (3)

$$Panel - A: \quad \frac{(E_t - E_{t-1})}{B_{-1}} = \alpha_0 + \alpha_1 R\Delta DIV_0 + \alpha_2 ROE_{t-1} + \varepsilon_t$$

		α_0	α_1	α_2	R^2	N
Pooled		$t =1$		
		0.571	-0.045	0.000	0.000	4944
		0.903	-0.425	-0.157		
CS						
	Mean	-0.101	-0.041	0.017	0.117	309
	t-stat	-0.763	-1.148	1.023		
	Prop+	0.438	0.313	0.375		
		$t =2$		
Pooled		-0.453	-0.011	0.000	0.000	4367
		-1.118	-0.167	-0.180		
CS						
	Mean	-0.488	0.006	0.000	0.012	291
	t-stat	-1.098	0.285	0.081		
	Prop+	0.429	0.143	0.714		

$$\frac{E_\tau - E_{\tau-1}}{B_{-1}} = \alpha_0 + \alpha_{1p} DPC_0.R\Delta DIV_0 + \alpha_{1n} DNC_0.R\Delta DIV_0 + \alpha_2 ROE_{\tau-1} + \alpha_3 \frac{E_0 - E_{-1}}{B_{-1}} + \varepsilon_\tau$$

$t =1$						
mean	0.031	-0.005	0.034	-0.001	-0.107	0.371	309
t-stat	0.609	-0.663	0.266	-1.415	-0.502		
Prop+	0.500	0.313	0.563	0.250	0.375		
$t =2$						
mean	-0.010	-0.007	0.002	0.000	-0.165	0.206	291
t-stat	-0.271	-1.312	0.025	0.381	-0.843		
Prop+	0.267	0.533	0.400	0.267	0.400		

So far, in all three models, we just dealt with rates; in other words, earnings were deflated by a related value in all models. Now, it comes to mind why we do not regress the level of earnings on the level of changes in dividends. Therefore, now we put earnings as the dependent variable in our model. To make sure about the unbiasedness of estimators, we control for the current year earning (E_0). Moreover, we generally add three

categories of control variables: past accounting variables such as book value per share at the beginning of the dividend change year (B_{-1}) and the earning in that year (E_{-1}), the market price of stocks (P_{-1}), and the changes in dividend level (ΔDIV_0). Like in the model (3), we allow for different coefficients on past dividend increases and decreases. We will test the following equation coefficients for $\tau = 1, 2, 3, 4,$ and 5.

$$E_\tau = \beta_0 + \beta_{1\tau} DPC_0.\Delta DIV_0 + \beta_{2\tau} DNC_0.\Delta DIV_0 + \beta_{3\tau} E_{-1} + \beta_{4\tau} B_{-1} + \beta_{5\tau} P_{-1} + \beta_{6\tau} DIV_{-1} + \beta_{7\tau} DPC_{-1}.\Delta DIV_{-1} + \beta_{8\tau} DNC_{-1}.\Delta DIV_{-1} + \beta_{9\tau} E_0 + \varepsilon_\tau \quad (4)$$

The results of the regressions in the model (4) are shown in table 4. Further, we designed a panel data and used Fama-Macbeth procedure. In this model, the variable $DPC_0.\Delta DIV_0$ is not so meaningful, but the variable $DNC_0.\Delta DIV_0$ in the third column has very meaningful results, suggesting/which suggests that dividend increases in Iran appear to be not necessarily indicative of future increasing revenues, but a reduction in dividends is a significant sign of a decline in future earnings of up to five years. It is only significant at the confidence level of 10% for the first year, but for the next years, it is significant at almost every level. Note that this result is precisely the opposite of the result that Nissim and Ziv (2001) came to in the US stock market. Also, in this regression of model 4, the three variables of past year dividend, share prices at the beginning of current year and last year's earnings have significant explanatory power, which, according to their definitions, is not surprising and is entirely justifiable.

The possibly wrong hidden assumption behind this model is that it has posed inflation to be low and not fluctuate so much because it is regressing the earnings of up until five years on some variables of the current year. However, the time value of money may bear harsh changes during even one or two years in Iran, a country which underwent consecutive over-thirty-percent inflations in some years. Therefore, the minimum expectation of people in Iran from earnings growth in future years is the compounded inflation rate of those years.

Therefore, since Iran has been experiencing significant inflation rate every year for at least the last two decades, inflation seems to have a direct impact on investors' expectation of future profitability and it should be taken into account in the model under consideration. In this regard, the question that arises at this stage of our research is how to account for the effect of inflation on investors' expectation of future profitability, and possibly on corporate managers' motivation to increase dividends.

In the Nissim and Ziv (2001) method, probably due to the relatively constant, low level of inflation in the United States (averaging below 2% per year in the last decade), there was no need for incorporating inflation rate into the analytical model or preparing the input data structures. For example, in an economy experiencing low inflation, dividend increases -even as small as 10 cents- are considered a real increase in dividends by investors. Nevertheless, in a country such as Iran whose economy has a high and varying inflation rate, at the end of a fiscal year, not only is a 50 IRR dividend increase of a share not considered as an increase, but perhaps a reduction in that dividends' real value as well.

Table 4. Result of model 4

$$E_\tau = \beta_0 + \beta_{1\tau}DPC_0.\Delta DIV_0 + \beta_{2\tau}DNC_0.\Delta DIV_0 + \beta_{3\tau}E_{-1} + \beta_{4\tau}B_{-1} + \beta_{5\tau}P_{-1} + \beta_{6\tau}DIV_{-1}$$
$$+ \beta_{7\tau}DPC_{-1}.\Delta DIV_{-1} + \beta_{8\tau}DNC_{-1}.\Delta DIV_{-1} + \beta_{9\tau}E_0 + \varepsilon_\tau$$

	Stat.	β_0	$\beta_{1\tau}$	$\beta_{2\tau}$	$\beta_{3\tau}$	$\beta_{4\tau}$	$\beta_{5\tau}$	$\beta_{6\tau}$	$\beta_{7\tau}$	$\beta_{8\tau}$	$\beta_{9\tau}$	R^2	N
1	Mean	99.974	0.116	0.226	-0.024	0.015	0.004	0.298	-0.201	-0.034	0.581		
	t-stat	2.471	0.922	1.939	-0.563	0.942	1.277	3.010	-1.626	-1.080	6.710	0.592	266
	Prop+	0.667	0.667	0.667	0.400	0.600	0.600	0.667	0.400	0.333	1.000		
2	Mean	177.795	0.059	0.475	0.024	0.001	0.014	0.474	-0.368	0.036	0.298		
	t-stat	3.263	0.417	3.963	0.435	0.028	2.219	4.322	-3.497	0.869	3.553	0.435	254
	Prop+	0.786	0.500	0.714	0.357	0.571	0.714	0.857	0.214	0.714	0.786		
3	Mean	228.502	-0.086	0.697	-0.002	-0.016	0.021	0.559	-0.327	-0.044	0.185		
	t-stat	4.579	-0.783	5.667	-0.031	-0.835	2.539	4.906	-2.611	-0.981	3.035	0.344	241
	Prop+	0.769	0.385	1.000	0.462	0.462	0.692	0.923	0.231	0.462	0.769		
4	Mean	220.698	-0.032	0.619	-0.100	0.010	0.017	0.679	-0.415	-0.062	0.127		
	t-stat	3.844	-0.355	8.288	-1.480	0.285	1.748	5.497	-2.568	-1.091	2.554	0.284	230
	Prop+	0.833	0.417	0.917	0.417	0.500	0.750	1.000	0.333	0.333	0.750		
5	Mean	305.537	0.050	0.573	0.068	-0.061	0.027	0.601	-0.247	0.068	0.026		
	t-stat	5.532	0.499	3.791	0.879	-2.193	3.733	4.794	-1.744	0.609	0.446	0.267	221
	Prop+	0.818	0.455	0.909	0.545	0.364	0.727	0.909	0.455	0.273	0.455		

Therefore, in the present study, we used a method to examine the effect of inflation on increasing investors' expectation of dividends growth. To study the Iranian market, which is undergoing high inflation rates, we selected a base year, the year 2001, and deflated all financial variables (amounts not rates) in the rest of the years to this base year with a compounded rate of annual inflation rates. For example, variables of the year 2003 are deflated to the base year 2001 with the year 2002 and 2003 inflation rates. In Iran, the Central Bank and Iranian Statistics Center, independently report inflation each year. We selected the inflation rates reported by the Central Bank of Iran, rearrange the data into the discounted variables, and re-ran the model 4 with this new deflated dataframe. in this model, named model 5 the statistic description of the dividend events are put in the table 5 - equivalent to table 1 for the deflated dividends- and coefficients of variables and test statistics are reported in the table 6. bear in mind that the equation for model 5 is the same as the equation in model and just the data is different.

Table 5. Statistic description of dividend events after deflation

Year	Div-Inc	Div_No Change	Div-Dec	Total Div Events
2001-2002	47	4	143	194
2002-2003	90	6	136	232
2003-2004	100	10	140	250
2004-2005	104	21	152	277
2005-2006	122	31	174	327
2006-2007	117	31	186	334
2007-2008	77	30	199	306
2008-2009	115	42	151	308
2009-2010	131	46	149	326
2010-2011	137	49	181	367
2011-2012	183	50	187	420
2012-2013	218	47	199	464
2013-2014	144	46	307	497
2014-2015	113	79	336	528
2015-2016	151	87	279	517
2016-2017	1999	580	2924	5503

As can be seen, taking into account the effect of inflation in subsequent years has caused a significant change in the results of the tables. The DNC0*ΔDIV0 variable, as before, has been significant over the next five years with relatively large test statistics and positive coefficients. This result indicates that if the real value of the dividend (the deflated amount) declines, the market will react negatively because it will be a relatively strong indication of a decline in the firm's future profitability. At the same time, we found that none of the cells in the column associated with the dividend increase are significant, and they have very small test statistics. It shows that the occasional dividend increases in Iran had no indication of future profitability increases, possibly because the firms did not have projects with a positive NPV in hand that needs cash. Thus, there is no need for shareholders money, and it is better to return it to its owners so that stock prices will not fall next year.

Table 6. Result after inflation

$$E_\tau = \beta_0 + \beta_{1\tau}DPC_0.\Delta DIV_0 + \beta_{2\tau}DNC_0.\Delta DIV_0 + \beta_{3\tau}E_{-1} + \beta_{4\tau}B_{-1} + \beta_{5\tau}P_{-1} + \beta_{6\tau}DIV_{-1}$$
$$+ \beta_{7\tau}DPC_{-1}.\Delta DIV_{-1} + \beta_{8\tau}DNC_{-1}.\Delta DIV_{-1} + \beta_{9\tau}E_0 + \varepsilon_\tau$$

	Stat.	β_0	$\beta_{1\tau}$	$\beta_{2\tau}$	$\beta_{3\tau}$	$\beta_{4\tau}$	$\beta_{5\tau}$	$\beta_{6\tau}$	$\beta_{7\tau}$	$\beta_{8\tau}$	$\beta_{9\tau}$	R^2	N
1	Mean	42.996	0.135	0.180	-0.009	0.013	0.003	0.262	-0.195	0.390	0.464	0.612	244
	t-stat	2.311	1.055	2.097	-0.291	1.168	1.142	3.069	-2.036	1.000	6.262		
	Prop+	0.600	0.667	0.733	0.533	0.600	0.667	0.733	0.333	0.400	1.000		
2	Mean	59.222	0.040	0.347	0.027	0.003	0.009	0.349	-0.272	0.302	0.172	0.442	236
	t-stat	3.063	0.344	4.202	0.734	0.197	2.225	4.727	-3.478	1.109	3.182		
	Prop+	0.857	0.500	0.786	0.429	0.571	0.714	0.929	0.286	0.714	0.786		
3	Mean	72.520	-0.101	0.330	-0.007	-0.013	0.011	0.265	-0.165	0.785	0.128	0.344	226
	t-stat	4.244	-1.307	5.836	-0.227	-1.240	2.852	4.938	-2.124	1.122	3.319		
	Prop+	0.846	0.385	1.000	0.462	0.385	0.769	0.923	0.308	0.462	0.769		
4	Mean	58.471	-0.038	0.274	-0.063	0.004	0.008	0.373	-0.265	0.354	0.061	0.280	215
	t-stat	3.680	-0.815	8.026	-1.968	0.236	2.002	5.755	-3.595	1.171	3.103		
	Prop+	0.833	0.333	0.917	0.250	0.500	0.833	1.000	0.167	0.500	0.833		
5	Mean	71.186	0.007	0.243	0.036	-0.029	0.009	0.219	-0.068	0.246	0.000	0.258	208
	t-stat	5.239	0.160	5.473	1.255	-3.578	3.906	4.291	-1.314	1.359	-0.004		
	Prop+	1.000	0.455	0.909	0.545	0.182	1.000	0.818	0.545	0.545	0.545		

Due to the autocorrelation of these two variables, the lags of these two variables were also included in the model. As can be seen, these later variables are statistically significant in contrast to the current year variables. Lag of increment DPC-1*ΔDIV-1 is significant up to four years with negative coefficients. In other words, dividend increases have a declining effect on future profitability with one year delay, which is fully explained by the DPC0*ΔDIV0 that indicates dividend increases are probably due to the lack of positive NPV projects and no need for liquidity.The decreasing dividend lag of DNC-1*ΔDIV-1 has not been significant in any year, which is well justified by the significance of the DNC0*ΔDIV0 variable in all of the years. In other words, the present variable has absorbed all the effects related to reducing the dividend. The control variables P-1, B-1, E-1, and E0 have been meaningful for some years as expected of their controlling role, which is in line with our expectation that these variables were actually included in the model to assure accuracy. The R^2 variable is about 61% in the first year and 44% in the second year, with a downward trend to the fifth year, which is exactly what we expect, and as we move away from the current year, this variable will show less explanatory power of the current year variables for future earnings. The level of R^2 in the early years is quite acceptable, and this indicates that the variables of this model have explained a significant portion of the level of profitability and its changes over the years.

4-3.Dividend Strategy selection for communicating the Market

According to figure one, we are now in a place to go forward.Managers can react to the signalling hypothesis for better communicating dividend strategies or even cheating the market. In addition, shareowners must predict this reaction to better understanding the managers for lowering agency costs. For discovering different scenarios, we must identify the position of the firm in the BCG Growth-share Matrix or equivalently in Industry life cycle model. Henderson(1979) argued that a business can position itself in one of the four items in a corporate portfolio.Also in an imaginary corporate one can imagine a corporate having only one business and position a business to find what strategy can use to enhance competitive advantage. For instance, a new company would be in question mark and after analysing the market can go to the Star position if shareowners invest enough amount of money to expand the market. When the market is matured, the business go to the cash cow position to Milk the owners with profit distribution and not investing anymore .In the End the shareowners must sell the business when it goes in the Dog position.Figure two better describe BCG growth-share Matrix.

Market growth rate	High	**Q**uestion Mark	**S**tar
	Low	**D**og	Cash Cow
BCG growth -share Matrix		Low	High
		Relative market share	

Figure 2. BCG growth-share matrix (Henderson, 1979)

For using the BCG the growth-share matrix in dividend strategy selection, First we compute the amount of dividend that a firm is planed to pay before knowing about the signaling hypothesis. It means the the company must compute the real dividend that they want to pay to shareowners regardless of knowing the result of the signaling hypothesis in the market (the right side of figure three). Second, we position the firm in the matrix. Third ,a manager could use the knowledge of signaling hypothesis to change the communication plan with the market based on the position the company has in the BCG growth-share matrix (the left side of figure three). Figure three shows the difference between what is want to do in dividend strategy before and after identifying the signaling hypothesis in the market. We assume that one of the four conditions could happen. We use the first category if the signaling hypothesis is not supported in any directions. In the second category, market data reveal there is signaling when the dividend gets increased and earning would be higher in the future but lowering dividend is not related to future earning. In the third category, decreasing the dividend is a signal of a lowering earning in near future but increasing dividend shows nothing to happen in the near future. In the last category, one can identify signaling in both directions and it means if we increase the dividend, the earning will be higher in near future and if we decrease the dividend, the earning will be lower in the next few years.For driling down more we go through each condition in detail:

No signaling identified

In this condition, what managers do in before and after signaling identification are the same in every level of the BCG Growth-share Matrix.There is no cheating potential and shareowners can trust whatever managers would claim about dividend.Equation 5 can explain this behavior in detail:

$$Q_C=Q_r,\ S_C=S_r, D_C=D_r, C_C=C_r \tag{5}$$

Where:

Q_r is the real dividend in the question mark position

Q_C is the communicated dividend in the question mark position

S_r is the real dividend in the star position

S_C is the communicated dividend in the Star position

D_r is the real dividend in the dog position

D_c is the communicated dividend in the dog position

C_r is the real dividend in the cash cow position

C_C is the communicated dividend in the cash cow position

It is needed to say that based on the logic of the BCG Growth-share Matrix,the amount of dividend increase from the question mark to the star and form the star to the cash-cow.But it decrease from the cash Cow to the dog .In brief equation 6 is true in real cases.

$$Q_r=0,\ 0=<S_r<=C_r,\ D_r<=C_r$$

$$\tag{6}$$

$$D_r=<C_r>=S_r>=Q_r$$

Only increase signaling identified

In this condition, if managers increase the dividend to deviate from the real dividend(that is computed before signaling identified), market (including shareowners) expect for increase earning in the near future so if firm locate in the question mark and the star cell would cheat the market and benefit for attracting huge amounts of investment because of incorrect signals. Also in the cash cow position the value of the company would go up incorrectly for pretending better future that shareowners could assume. Furthermore, in the dog position managers can have enough time for finding a buyer for the whole company to divest from industry.

Managers could cheat shareowners especially in the dog position when the company can pretend to be valuable by increasing dividend to shareowners when it is logically false for that position.

Shareowners cannot identify the exact position of the company (the dog vs the cash cow) when increase signaling happens and managers increase the dividend to cheat shareowners subsequently.Equation seven can show this unreal future that managers can make for shareowners in simple equations. Comparing equation six (the real) and seven (unreal for better communication using signaling hypothesis) can show cheating potential evidently.

$$Q_C>=Q_r,\ S_C>=S_r, D_C>=D_r, C_C>=C_r \tag{7}$$
$$D_C>=C_C>=S_C>=Q_C$$

Dividend policy before considering signaling hypothesis	**Dividend policy after considering signaling hypothesis**

When no signaling identified

DIV=Q_c	DIV=S_c
DIV=D_c	DIV=C_c

$Q_C=Q_r, S_C=S_r, D_C=D_r, C_C=C_r$

Only increase signaling identified

DIV=Q_c	DIV=S_c
DIV=D_c	DIV=C_c

$Q_C >= Q_r, S_C >= S_r, D_C >= D_r, C_C >= C_r$
$D_C >= C_C >= S_C >= Q_C$

Only decrease signaling identified

DIV=Q_r	DIV=S_r
DIV=D_r	DIV=C_r

$Q_r=0, 0=<S_r<=C_r, D_r<=C_r$
$D_r=<C_r>=S_r>=Q_r$

DIV=Q_c	DIV=S_c
DIV=D_c	DIV=C_c

$Q_C=Q_r, S_C=S_r, D_C=D_r, C_C=C_r$
$D_C=C_C >= S_C >= Q_C$

Signaling identified in both direction

DIV=Q_c	DIV=S_c
DIV=D_c	DIV=C_c

$Q_C >= Q_r, S_C >= S_r, D_C >= D_r, C_C >= C_r$
$D_C >= C_C >= S_C >= Q_C$

Figure 3. Signaling hypothesis and cheating potential

Only decrease signaling identified

In this condition, decreasing signaling can tell about bad earning in the future over the market. By understanding having decrease signaling potential in the market, managers would not decrease the dividend for protecting the firm for bad signals. In addition, they would not increase the dividend because of not signaling potential in the market. Therefore, equation eight could be true and no change between real and communicating dividend occur. The most important phenomenon that is shown in equation 8 is the equality between the cash cow and the dog dividend. This is the result of cheating potential that decreasing the amount of dividend could signal to the market for the dog position and managers do not want to communicate this truth to shareowners.

$$Q_C=Q_r,\ S_C=S_r,\ D_C=D_r, C_C=C_r \tag{8}$$
$$D_C=C_C>=S_C>=Q_C$$

Signaling identified in both direction

As managers know that signaling is identified in both directions, they could increase dividend for using signaling potential whenever possible. In addition, they do not decrease the amount of the dividend even in the dog cell of the BCG growth-matrix.Thus equation nine can result from this situation and the cheating potential exists the same as previous conditions but in a more and serious way.

$$Q_C>=Q_r,\ S_C>=S_r,\ D_C>=D_r,\ C_C>=C_r \tag{9}$$
$$D_C>=C_C>=S_C>=Q_C$$

Conclusions, managerial implication and Limitations

In this paper, we go to the process of applying the signaling hypothesis to the firm (figure two) that is fully described and applied in the whole paper. First, we analyze the Iranian stock market as an example of an emerging market that is rarely investigated for signaling hypothesis in previous research. We show that an increasing amount of the dividend has no signal to shareowners but decrease the payment to stock owners have a great signal (empirical contribution). Then we show that managers could cheat shareowners based on the position they have in the BCG Growth-Share Matrix (theoretical contribution). Based on our analysis in the example of the Iranian Market we must use the third scenario and take care of the dog position that managers could preserve payment to a dividend to pretend their business is going well as the cash cow position (managerial implication). This research shows and predicts the agency cost that managers can make for shareowners when they identified the signaling hypothesis is working in the stock market (theoretical contribution).

We have some limitations in our research. Prior empirical research show in most cases we have positive signaling or no signaling in the market. Therefore, all Scenarios we analyze in figure three assume managers want to react to positive signaling. In rare cases, we can identify negative signaling in the market, where increasing dividend signals negatively to the market, for instance, decreasing in earning and lowering the total value of the firm. In that case, you must analyze again and re-write the analysis. In this research, we forecast the managerial reactions

to the signaling hypothesis for the first time. I propose other researchers to test this modeling by analyzing managers in their market for better understanding the mechanisms and chains of actions and reactions.

References

Abdulla, J. (2016). Focus on dividend practices of Omani firms: Survey findings. Journal of Finance Management and Analysis, 29(2). https://ssrn.com/abstract=2965675

Adelegan, O. J. (2003). An Empirical Analysis of the Relationship between Cash Flow and Dividend Changes in Nigeria. African Development Review, 15, 35-49. https://doi.org/10.1111/1467-8268.00061

Aharony, J., Falk, H., & Swary, I. (1988). Information content of dividend increases: The case of regulated utilities. Journal of Business Finance and Accounting, 15(3), 401–14. https://doi.org/10.1111/j.1468-5957.1988.tb00143.x

Ahmed, H. & Attiya, J. (2009). Dynamics and determinants of dividend policy in Pakistan (evidence from Karachi Stock Exchange non-financial firms). International Journal of Finance and Economics, 25, 148-171. Retrived from https://mpra.ub.uni-muenchen.de/37342/

Afza, T. & Mirza, H. (2010). Ownership structure and cash flows as determinants of corporate dividend policy in Pakistan. International Business Research, 3(3). https://doi.org/10.5539/ibr.v3n3p210

Aivazian, V., Booth, L., & Cleary, S. (2003). Do emerging market firms follow different dividends policies from US firms?. The Journal of Financial Research, 26(4), 371– 387. https://doi.org/10.1111/1475-6803.00064

Al-Najjar, B. (2009). Dividend behaviour and smoothing: new evidence from Jordanian panel data. Studies in Economics and Finance, 26(3), 182-197. https://doi.org/10.1108/10867370910974017

Al-Qudah, A., & Badawi, A. (2015). The Signaling Effects and Predictive Powers of Dividend Announcements: Evidence from Kingdom of Saudi Arabia. Journal of Business and Economics, 6(3), 550-557. https://doi.org/10.15341/jbe(2155-7950)/03.06.2015/012

Al-Yahyaee, K., Pham, T. & Walter, T. (2006). Capital structure and dividend policy in a personal tax free environment: the case of Oman. Unpublished PhD. Dissertation, University of New South Wales.

Al-Shattarat, W., Al-Shattarat, B., & Hamed, H. (2018). Do dividends announcements signal future earnings changes for Jordanian firms?. Journal of Financial Reporting and Accounting, 16(3), 417-442. https://doi.org/10.1108/JFRA-03-2017-0021

Baker, H.K, Dewasiri, N., Yatiwelle Koralalage, W. & Azeez, A. (2019). Dividend policy determinants of Sri Lankan firms: a triangulation approach. Managerial Finance, 45(1), 2-20. https://doi.org/10.1108/MF-03-2018-0096

Baker, H.K., & Jabbouri, I. (2016). How Moroccan managers view dividend policy. Managerial Finance, 42(3), 270–288. https://doi.org/10.1108/MF-07-2015-0211

Baker, H.K., & Jabbouri, I. (2017). How Moroccan institutional investors view dividend policy. Managerial Finance, 43(12), 1332–1347. https://doi.org/10.1108/MF-06-2017-0215

Baker, H.K., Kapoor, S., & Jabboury, I. (2018). Institutional perspectives of dividend policy in India. Qualitative Research in Financial Markets, 10(3), 324-342. https://doi.org/10.1108/QRFM-07-2017-0067

Baker, H.K, Kilincarslan, E., & Arsal, A. (2017). Dividend policy in Turkey: Survey evidence from Borsa Istanbul Firms. Global finance journal, 35(2), 43-57. https://doi.org/10.1016/j.gfj.2017.04.002

Baker, H.K, Powell, G., & Veit, E. (2002). Revisiting managerial perspectives on dividend policy. Journal of Economics and Finance, 26(3), 267–283. https://doi.org/10.1007/BF02759711

Basse, T. (2019). The impact of the financial crisis on the dividend policy of the European insurance industry: additional empirical evidence. Zeitschrift für die gesamte Versicherungswissenschaft, 108(1), 3–17. https://doi.org/10.1007/s12297-019-00429-w

Bhattacharya, S. (1979). Imperfect information, dividend policy, and the bird in the hand fallacy. The Bell Journal of Economics, 5(1), 259–70. https://doi.org/10.2307/3003330

Benartzi, S., Michaely, R., & Thaler, R. (1997). Do changes in dividends signal the future or the past?. Journal of Finance, 52(3), 1007-1034. https://doi.org/10.1111/j.1540-6261.1997.tb02723.x

Berezinets, I.V., Bulatova, L.A., Ilina, Y.B., & Smirnov, M.V. (2019). Reactions of emerging stock markets to dividend announcements during economic growth: evidence from India and Russia. Eurasian Economics Review, 9(1), 71–89. https://doi.org/10.1007/s40822-018-0111-7

Booth, L., Aivazian, V., Demirguc-Kunt, A. & Maksimovic, V. (2001). Capital structures in developing countries. The Journal of Finance, 56, 87-130. https://doi.org/10.1111/0022-1082.00320

Borde, S., Byrd, A., & Atkinson, S. (1999). Stock price reaction to dividend increases in the hotel and restaurant sector. Journal of Hospitality and Tourism Research, 23(1), 40-52. https://doi.org/10.1177%2F109634809902300104

Braggion, F. & Moore, L. (2011). Dividend policies in an unregulated market: The London Stock Exchange. Review of Financial Studies, 24, 2935-2973. Retrieved from https://econpapers.repec.org/RePEc:oup:rfinst:v:24:y:2011:i:9:p:2935-2973

Brav, A., Graham, J., Harvey, C., & Michaely, R. (2005). Pay-out policy in the 21st century. Journal of Financial Economics, 77(3), 483-527. https://doi.org/10.1016/j.jfineco.2004.07.004

Chaudhary, G.M., Hashmi, S.H., & Younis, A. (2016). Does Dividend Announcement Generate Market Signal? Evidence from Pakistan. International Journal of Economics and Financial Issues, 6(1), 65-72. Retrieved from https://www.semanticscholar.org/paper/Does-Dividend-Announcement-Generate-Market-Signal-Chaudhary-Hashmi/5081688b602942ade85e9be8c7344889be5f7a0a

Dasilas, A. (2009). Stock market reaction to dividend announcements: Evidence from the Greek Stock Market. https://dx.doi.org/10.2139/ssrn.981885

DeAngelo, H., DeAngelo, L., & Skinner, D. (1996). Reversal of fortune: dividend signalling and the disappearance of sustained earnings growth. Journal of Financial Economics, 40, 341-371. https://doi.org/10.1016/0304-405X(95)00850-E

Denis, D., & Osobov, I. (2008). Why do firms pay dividends? International evidence on the determinants of dividend policy. Journal of Financial Economics, 89, 62–82. https://doi.org/10.1016/j.jfineco.2007.06.006

Eades, K., Hess, P., & Kim, E. (1985). Market rationality and dividend announcements. Journal of Financial Economics, 14, 581-604. https://doi.org/10.1016/0304-405X(85)90027-3

Ghafoor, A., Khan, M.A., Shah, S.A., & Khan, H.H. (2014). Inflation and dividend behavior of Pakistani firms: An empirical investigation using ARDL. International Journal of Business and Management, 9(9), 86-95. https://doi.org/10.5539/ijbm.v9n9p86

Gonedes, N. (1978), Corporate signalling, external accounting, and capital market equilibrium: Evidence on dividends, income, and extraordinary items. Journal of Accounting Research, 16, 26-79. https://doi.org/10.2307/2490411

Gordon, M. (1962). The investment, financing, and valuation of the corporation. R. D. Irwin.

Grullon, G., Michaely, R., Benartzi, S., & Thaler, R. (2005). Dividend changes do not signal changes in future profitability. Journal of Business, 78, 1659-1682. https://doi.org/10.2139/ssrn.431762

Grullon, G., Michaely, R. & Swaminatham, B. (2002). Are dividend changes a sign of firm maturity?. Journal of Business, 75(3), 387-424. https://doi.org/10.1086/339889

Gupta, M., & Aggrawal, N. (2018). Signaling Effect of Shifts in Dividend Policy: Evidence from Indian Capital Markets. Business Perspectives and Research, 6(2), 142-153. https://doi.org/10.1177%2F2278533718764505

Ham, C., Kaplan, Z., & Leary, M.T. (2019), Do Dividends Convey Information About Future Earnings? http://dx.doi.org/10.2139/ssrn.3176055

Harada, K., & Nguyen, P. (2005). Dividend change context and signaling efficiency in Japan. Pacific-Basin Finance Journal, 13, 504-522. https://doi.org/10.1016/j.pacfin.2005.01.001

Healy, P., & Palepu, K. (1988). Earnings information conveyed by dividend initiation and omissions. Journal of Financial Economics, 21(2), 149-75. https://doi.org/10.1016/0304-405X(88)90059-1

Henderson, B. D. (1979). Henderson on corporate strategy. Cambridge, Mass.: Abt Books.

Impson, M. (1997). Market reaction to dividend-decrease announcements: Public utilities vs. unregulated industrial firms. The Journal of Financial Research, 20(3), 407-22. https://doi.org/10.1111/j.1475-6803.1997.tb00257.x

Jensen, M. (1986), Agency costs of free cash flow, corporate finance, and takeovers. American Economic Review, 76, 323–329. https://www.jstor.org/stable/1818789

Jensen, M. & Meckling, W. (1976). Theory of the firm: managerial behaviour, agency costs and ownership structure. Journal of Financial Economics, 3(2), 305-360. https://doi.org/10.1016/0304-405X(76)90026-X

John, K. & Williams, J. (1985). Dividends, dilution, and taxes: A signalling equilibrium. The Journal of Finance, 40(4), 1053-1070. https://www.jstor.org/stable/2328394

Kadıoğlu, E., & Öcal, N. (2016). Dividend Changes and Future Profitability: Evidence from the Turkish Stock Market. International Journal of Economics and Finance, 8(3), 196-205. https://doi.org/10.5539/ijef.v8n3p196

Kaplan, Z., & Perez Cavazos, G. (2019). Dividend Signaling With Excess Cash. http://dx.doi.org/10.2139/ssrn.3393065

Khanal, A.R., & Mishra, A.K. (2017). Stock price reactions to stock dividend announcements: A case from a sluggish economic period. North American Journal of Economics and Finance, 42, 338-345. https://doi.org/10.1016/j.najef.2017.08.002

Liaqat, A., Saima, B. & Saqib, A. (2019). Managerial perspective regarding signaling effects of dividend policy: a case study of Pakistan stock exchange. City University Research Journal, 9(1), 98-111. Retrieved from http://www.cusit.edu.pk/curj/Journals/Journal/Jan%202019/08%20Article.pdf

Liu, C., & Chen, A. (2015). Do firms use dividend changes to signal future profitability? A simultaneous equation analysis. International Review of Financial Analysis, 37, 194-207. https://doi.org/10.1016/j.irfa.2014.12.001

Lotfi, T. (2018). Dividend and Stock Repurchase Announcement in Tunisia: A Signaling Approach. Global Journal of Management and Business Research, 18(1), 33-52. https://journalofbusiness.org/index.php/GJMBR/article/view/2419

Lukose, J., & Rao, S. (2010). Dividend changes and profitability: an empirical study of Indian manufacturing firms. The IUP Journal of Applied Finance, 6(1), 1-25. https://www.questia.com/library/journal/1P3-1965392461/dividend-changes-and-profitability-an-empirical-study

Lys, T., Naughton, J., & Wang, C. (2015). Signaling through corporate accountability reporting. Journal of Accounting and Economics, 60(1), 56-72. https://doi.org/10.1016/j.jacceco.2015.03.001

Nam, H.J. (2018). The dividend payout policy and R&D for loss firms: evidence from South Korea. Asia-Pacific Journal of Accounting & Economics, 26(1-2), 172-183. https://doi.org/10.1080/16081625.2019.1546564

Nissim, D., & A. Ziv. (2001). Dividend changes and future profitability. Journal of Finance, 56, 2111-2133. https://doi.org/10.1111/0022-1082.00400

Miller, M.H., & F. Modigliani. (1961). Dividend policy, growth, and the valuation of shares. Journal of Business, 34, 411-433. http://dx.doi.org/10.1086/294442

Miller, M. & Rock, K. (1985). Dividend policy under asymmetric information. The Journal of Finance, 40(4), 1031-1051. https://doi.org/10.1111/j.1540-6261.1985.tb02362.x

Penman, S. (1983). The predictive content of earnings forecasts and dividends. Journal of Finance, 38, 1181-1199. https://doi.org/10.1111/j.1540-6261.1983.tb02290.x

Rabbani, N. (2017). The Announcement Effect of Cash Dividend Changes on Share Prices: Evidence from Dhaka Stock Exchange. Review of Pacific Basin Financial Markets and Policies, 20(4), 1750025(1-19). https://doi.org/10.1142/S0219091517500254

Smith, D.D., & Pennathur, A.K. (2017). Signaling Versus Free Cash Flow Theory: What Does Earnings Management Reveal About Dividend Initiation?. Journal of Accounting, Auditing & Finance, 34(2), 284-308. https://doi.org/10.1177%2F0148558X17724051

Smith M. (2002). Derrick's Ice–Cream Company: applying the BCG matrix in customer profitability analysis. Accounting Education 11 (4), 365–375. ,https://doi.org/10.1080/0963928021000031457

Tao, Q., Nan, R., & Li, H. (2016), Information content of unexpected dividends under a semi-mandatory dividend policy: An empirical study of China. The North American Journal of Economics and Finance, 37, 297-318. https://doi.org/10.1016/j.najef.2016.05.001

Tran, Q.T., & Mai, Y.D. (2015). Stock Market Reaction to Dividend Announcements from a Special Institutional Environment of Vietnamese Stock Market. International Journal of Economics and Finance, 7(9), 50-58. https://doi.org/10.5539/ijef.v7n9p50

Travlos, N., Trigeorgis, L., & Vafeas, N. (2001). Shareholder wealth effects of dividend policy changes in an emerging stock market: the case of Cyprus, Multinational Finance Journal, 5(2), 87-112. Retrieved from http://www.mfsociety.org/modules/modDashboard/uploadFiles/journals/googleScholar/696.html

Watts, R. (1973). The information content of dividends. Journal of Business, 46, 191-211. http://dx.doi.org/10.1086/295525

Widiatama Yulizar, Abdul Hamid Aceng, Martono (2018), International Journal of Economics and Financial Issues, 8(4), 222-226. https://www.econjournals.com/index.php/ijefi/article/view/6652

Zhao, R.L. (2016). Dividend Signaling: What Can We Learn from Corporate Bond Responses?. Journal of Internet Banking and Commerce, 21(1), 1-15. http://www.icommercecentral.com/open-access/dividend-signaling-what-can-we-learn-from-corporate-bond-responses.php?aid=70481

Alireza AGHAEE Shahrbabaki is a Ph.D student at Bocconi University, Department of Finance, Bocconi School of Management, Milan, Italy
ORCID ID: 0000-0001-5670-9092

Saeed SAKKAKI is an MBA graduate from Graduate School of Management and Economics, Sharif University of Technology, Tehran, Iran
ORCID ID: 0000-0001-5476-6077

Peyman PARSA is an MBA graduate from Department of Industrial Enginerring, K.N. Toosi University ofTechnology, Tehran, Iran
ORCID ID: 0000-0002-3064-8663

Mohammad Saeed HEIDARY is a Ph.D student at Department of finance, Faculty of Management and Accounting, Allameh Tabataba'i University, Tehran, Iran**.**
ORCID ID: 0000-0003-2383-4174

Vahid YOUSEFIPOUR is MBA graduate from Graduate School of Management and Economics, Sharif University of Technology, Tehran, Iran
ORCID ID: 0000-0002-6841-5646

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

CONTROLLED FOREIGN COMPANIES: INFLUENCE ON THE SOVEREIGNTY OF THE NATIONAL TAX BASE

Liudmila I. Khoruzhy [1*], Malvina R. Karabasheva [2], Hafis Ahmed oglu Hajiyev [3], Natalia N. Zhadobina [4], Natalia A. Alekhina [5], Rustem A. Shichiyakh [6]

[1*]*Russian State Agrarian University - Moscow Timiryazev Agricultural Academy, Timiryazevskaya street, 49, 127550, Moscow, Russian Federation*
[2]*Financial University under the Government of the Russian Federation, Moscow, Russian Federation, Leningradsky Prospekt, 49, 125993, Moscow, Russian Federation*
[3]*Azerbaijan State University of Economics (UNEC), Istiqlaliyyat street 6, AZ1001, Baku, Republic of Azerbaijan*
[4]*Surgut State University, Lenin Ave., 1, 628403, Surgut, KhMAO - Ugra, Russian Federation*
[5]*Sechenov First Moscow State Medical University of the Ministry of Health of the Russian Federation, Bolshaya Pirogovskaya str., 19/1, 119146, Moscow, Russian Federation*
[6] *Kuban State Agrarian University named after I.T. Trubilin, Kalinina street 13, 350044, Krasnodar, Krasnodar region, Russian Federation*

E-mails: [1*] *dka1955@mail.ru (Corresponding author)*

Abstract. World experience in economic development over recent periods indicates that, despite periodically occurring crisis situations, including globalization processes appearing all over specific countries, Such situations consistently develop on a more accelerated scale. Undoubtedly, the crisis situation that developed in the world market in the first half of 2020 under the influence of COVID-19 on all economies of countries without exception has had a great influence, and the nature of such an influence will certainly be felt over the next several years. In this vein, the establishment of the rules applicable in a particular jurisdiction regarding the activities of controlled foreign companies is one of the mechanisms for any state to protect its own national tax base. Using this approach, the modern rules of tax regulation of controlled foreign companies provide for the establishment of special rules for the shareholders, acting as controlling persons in terms of profits obtained from their foreign companies. At the same time, the application of tax exemptions to the profits of controlled foreign companies is undoubtedly one of the riskiest operations, despite the fact that a wide list of grounds for their application may be provided for within the specific state. As a result of a study of the activities of controlled foreign companies operating within the framework of national jurisdiction, when analyzing the degree of influence of tax bases, a strongly pronounced linear relationship with a correlation coefficient of -0.93 was revealed. This circumstance made it possible to identify the following important feature for controlled foreign companies: financial corporations are no longer attracted by the option of being in a specific national jurisdiction; moreover, they are more focused on other jurisdictions, including low-tax or offshore ones. The correlation analysis revealed a strongly pronounced linear relationship between the tax base and the tax rates; however, in terms of controlled foreign companies, which are primarily subject to national legislation, the correlation coefficient amounted to +0.89, which characterizes the economic tendency to reduce their financial investments, despite the reduction of the actual tax rate. In turn, for controlled foreign companies, whose activities are regulated to a greater extent by foreign legislation, the correlation coefficient amounted to -0.93, which is characterized by a reflection of the greater economic effect of actual tax rate reduction according to the following scenario: the tax rate reduction represents more financial injections for a particular national jurisdiction. At the same time, against the background of the quite consistent and successful in specific areas unification of EU tax rules, the problem of the incoherence of the rules concerning controlled foreign companies versus national jurisdictions of both

EU member states and other countries remains open and relevant. This circumstance contains controversial issues regarding the legitimacy of the application of the general regime of controlled foreign companies, since taking into account the fundamental economic freedoms, which, in particular, are enshrined in the OECD Model Double Taxation Convention on Income and Capital, the legitimacy of establishment of the internal rules of controlled foreign companies for various kinds of challenges, including Brexit, are sufficiently controversial.

1. Introduction

The established procedure of doing business using the territories of several jurisdictions necessitates the state to pay close attention to the tax policy pursued not only in relation to corporate revenues within the jurisdiction. Attention should be paid to the taxation procedure when income is received by tax residents outside the country. This circumstance leads to a more detailed study of theoretical and practical aspects in the field of international taxation (Eshuis, 2014). At the same time, the consideration of cases of practical tax evasion through various international structures remains the indirect aspect. Consequently, this circumstance strengthens the need for a more detailed approach to study and procedure of reconciliation of the practical aspects of protection of the national tax base from its diversion (Aburto, 2007), taking into account the development of effective mechanisms to counter tax evasion, including the use of gray tax evasion schemes by foreign structures, etc.

In this regard, the establishment of rules (procedures) applicable in a particular jurisdiction regarding the taxation of controlled foreign companies (CFCs) is one of the mechanisms to protect their own national tax base. Using this approach, the state provides for the establishment of a taxation procedure for the shareholders (who are controlling persons) of a portion of the profits from their foreign companies (Sangiovanni, 2013). At the same time, a certain part of foreign companies may be outside the national jurisdictions using the preferential tax regimes (Grossule, 2020). Therefore, the procedure of doing business outside the national jurisdiction is not to a certain extent relevant for controlling persons when applying the provisions on CFCs, since the tax rules are leveled, and the tax obligations are equalized.

2. Literature review

There is an active interaction in the practical activities of the EU countries between fiscal authorities and tax fraud and tax evasion, as well as aggressive tax planning of the corporations. So, following the results of the 2013 meeting of the CFE fiscal committee (European Confederation of Tax Advisers) in Brussels, where the negative impact of fraudulent actions by taxpayers on the economies of the member states of the European Union was discussed, specific measures aimed at countering tax evasion were proposed (Aggarwal, 2011). This approach adequately indicates the increased attention of the entire world community to the financial situation within each country. Consequently, the states are uniting to stabilize the national economy and combat the "diversion" of the tax base and profits transfer (Hampl, 2020). Thus, the international taxation theorists Bertrand (2015) and Akamah (2018) proposed a general rule concerning CFCs, which to one degree or another is contained as separate elements of its definition: "if a company from one country is controlled by the persons who are simultaneously residents of another country and participants in this company, these persons will pay tax on all profits of this company, if this profit is transferred by them in order to avoid taxation". In this regard, the following conditions

can be distinguished for recognition of a company controlled in accordance with the legislation on CFCs for the jurisdiction of each country:

1) the legal entity belongs to the foreign company (Arregle, 2016);
2) the company is controlled by a person who is a tax resident;
3) tax evasion is a goal pursued upon receipt of profit, which is subsequently transferred to a foreign company (Huang, 2018).

To the extent that three conditions are met simultaneously, the resident will be obliged to pay the foreign company income tax in the respective country (jurisdiction). This approach is also applied in the Russian tax legislation. In particular, as a rule, a foreign organization is recognized as a CFC when the following conditions are met simultaneously: the company is not recognized as a tax resident of the country's jurisdiction, while the controlling person of the company is a company and (or) an individual recognized as the tax resident of the country (Nigamaev et al., 2018; Sazanov and Akhmetshin, 2016; Garnov et al., 2020).

It should be noted that in the opinion of Turishcheva (2020), provision of a decisive influence or the ability to exercise a decisive influence on the decisions made by such a company when distributing the profit (income) after taxation due to direct or indirect participation in such a company, participation in the contract (agreement), the subject matter of which is the company management, or other features between the person and the organization and (or) other persons, is recognized as control over the company.

Since the general tax rules for the CFCs, in the opinion of Akhmadeev (2019) and Morozova (2019), are not fully developed, accordingly, the national legislation governing the procedure for taxation and control over the activities of the CFCs must comply with international principles and norms contained in international treaties and acts (Almunia, 2018). In this regard, it is important to analyze national legislation for its compliance with international principles. In particular, they include: the principle of legality, the principle of equality, the principle of freedom of economic activity, etc. As a rule, the practice of taxation in relation to CFCs is a special legal institution that takes into account the basic foundations of the problems of business structuring both in national jurisdiction and beyond its limits, including relations with offshore jurisdictions, preventing the national jurisdiction from lagging behind the application of international agreements and the exchange of tax information.

In turn, the practical experience of application of the legislation on CFCs indicates the existence of various opinions of the economists Iurko (2018) and Arner (2020), pointing out the shortcomings of certain existing provisions. In particular, these shortcomings concern the established threshold for notification and income tax payment (Lehoux, 2019), the additional burden on businesses related to the translation of statements for national use (Kosov, 2016; Vertakova et al., 2019; Akhmetshin et al., 2019), and the absence of clearly established provisions distinguishing between revenues in various industry aspects (Bykanova, 2018; Rahman and Bobkova, 2016; Prodanova et al., 2019). To date, many issues have not been resolved, the legislation on CFCs in the framework of national regulation continues to be edited, amended, and improved (Petrova, 2019; Puryaev et al., 2019). In this regard, attention should be paid to the current procedure for determining CFCs, based on its criteria for individual states.

3. Theoretical background

In the international taxation practice, the general condition for the recognition of a person as a controlled one is the ability of the controlling person to influence it in any respect. At the same time, a legal standpoint involves the reservation on the attribution of the CFCs exclusively to the category of a foreign person. At the same time, the current procedure applied in most world countries in relation to CFCs recognizes a foreign legal entity (i.e., having a corporate form) and does not apply to their other forms, in particular, to foundations, trusts, etc.

It should be noted that in order to recognize a foreign company belonging to the CFC category, the current legal status of a state belonging to a particular jurisdiction is more applicable. This approach is used in countries such as the USA and Germany. The provisions of the OECD recommend the use of an expanded definition of the

CFCs in national jurisdictions. This is no coincidence since in this case, the scope of taxation will be used in relation to permanent missions. Consequently, if a taxpayer receives additional profit using permanent missions outside of national jurisdiction, the state will additionally receive budget revenues, taking into account the establishment of fair income tax rates and compliance with tax principles.

The definition of the CFCs is inextricably linked with the definition of tax residency. Moreover, the tax residency of companies and structures can be determined in various ways. In particular, states can recognize companies as foreign using both a formal criterion (existence of a place of incorporation of a company in a foreign state) or based on an expanded approach, for example, when establishing the role and place of the central government in a particular jurisdiction. In particular, the current German tax law contains a condition for the recognition of a foreign company as a controlled one. For this purpose, it must be registered in a foreign country in which the office is physically located and the company is managed. At the same time, a company is recognized as a tax resident of Germany if physically its office or its management is located in Germany. Respectively, the provisions of the internal legislation on CFCs are not applicable to this category of taxpayers.

In turn, from a legal standpoint in the UK, a stepwise approach is applied when classifying a company as a CFC. At the first stage, the company is tested on the basis of its place of residence in the relevant national jurisdiction. In the event that the company is registered in the United Kingdom, and its place of business is in another territory (outside its location), and such a person pays taxes, taking into account the nature of the effect of double taxation avoidance agreements, the fundamental value in determining the CFC will be the amount of income received in a specific jurisdiction. In this case, the amount of income received for the tax period must be at least 50% of the total. Directly, in the practice of taxation, disputes arise between taxpayers and tax authorities regarding the procedure of the place of residence of the CFC. In this regard, prominence should be given to the following criteria for the recognition of CFCs (Fig. 1).
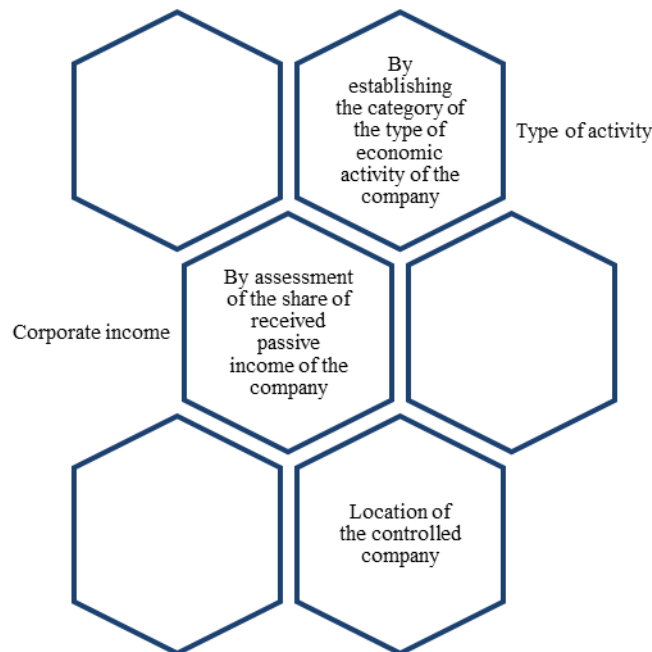
Figure 1. Basic criteria for compliance with the recognition of the CFC
Source: compiled by the authors

It should be noted that when determining the location of a company to meet the criteria of the CFC, the states form special registers at the legislative level that correspond to different jurisdictions. In particular, the states or certain (offshore) territories that do not carry out the fair competition and are not included in the current procedure for mutual tax exchange of information between fiscal authorities in relation to both taxpayers and their transactions may be included in the illegal environment.

Special attention should be paid to the formation by the states of a separate list of jurisdictions, in which reduced tax rates are applied or the companies are completely tax exempt; therefore, in this case, the CFC taxation procedure may be justified from the point of view of obtaining additional tax revenues to the budget (Korableva et al., 2018). In addition to the criteria-based approach to the recognition of the persons attributable to CFCs, an important aspect is the current procedure for their profit taxation. In this case, the established procedure for calculating the taxable amount of profit, taking into account the legal qualifications of the transaction, is the most significant.

In general, the obtained value of the profit of the CFC shall be included in the tax base of the controlling person or in proportion to its participation or control. This taxation procedure is applied in most countries. Moreover, in most cases, the tax law of states contains significant elements of provisions that exclude the application of the general procedure for CFC taxation. However, an important aspect in taxation, in particular in Spain, Germany, and the USA, is the observance of "deminimis". This involves the cases when, in the calculation of the income received, the CFC is restricted to the limit of the established threshold values. In establishing the legal qualifications of a transaction in relation to the profits received by the CFC, the following concepts are applied:
1) the recognition of actual profit as the value of "supposed" dividends (fictitious distribution of profits);
2) the identification of the actual amount of profit in respect of the controlled person.

In this regard, when the taxpayer chooses the appropriate version of the concept, it will lead to the application of the legally established tax rules for the CFC, taking into account the current tax rates. At the same time, from the standpoint of tax administration rules, most states have a clear establishment of the procedure for annual notification by the taxpayers of the presence of CFCs on the basis of the presentation of established forms, as well as the procedure for providing grounds for exemption of the CFC's profits from taxation.

4. Data analysis

When considering the procedure for presenting the grounds for exempting the CFC's profits from taxation, taking into account the current taxation procedure, attention should be paid to the general list containing the conditions for their provision. Moreover, if at least one of the following conditions can be attributed to a specific CFC, then its profit is exempt from taxation on the basis of the general conditions provided in Figure 2.
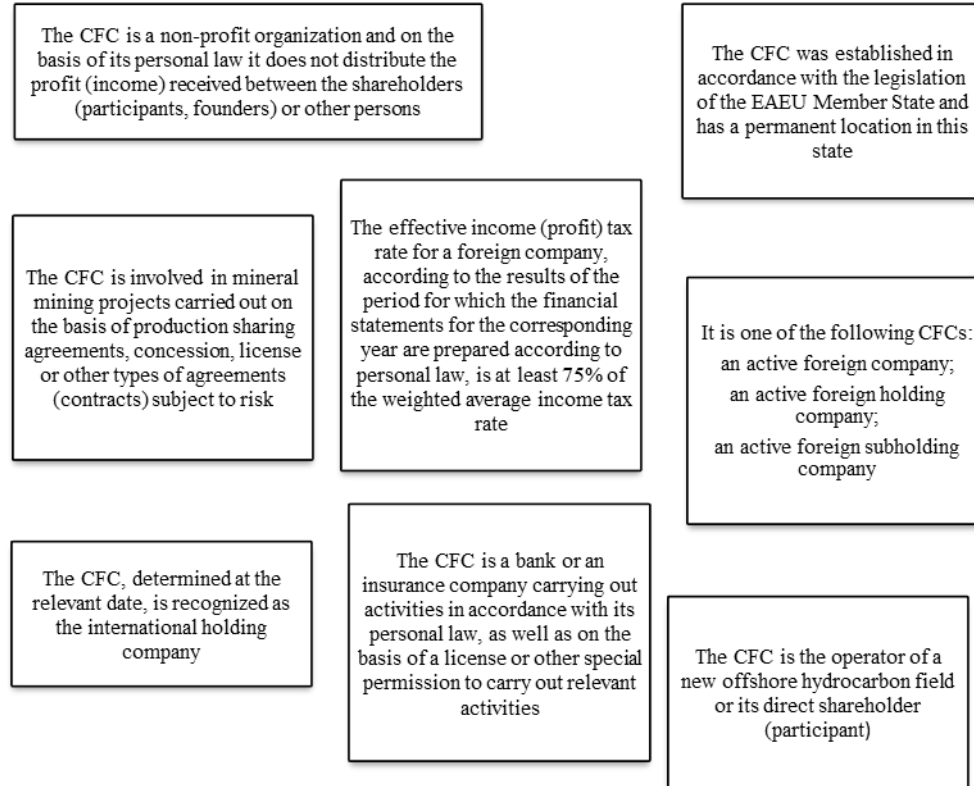
Figure 2. Basic principles of the application of exemption from taxation of profits of the CFC by the example of national tax jurisdiction
Source: compiled by the authors

It should be noted that in order to exempt the CFC from taxation, it is also important to comply with the provisions regarding the legal aspects of circulating bonds and debt obligations and the mandatory presence of a valid international treaty in the field of taxation with an appropriate exchange of information established for these purposes between the national tax jurisdiction and the state in which the CFC is located on a permanent basis. This is the key condition for exemption of the CFC from income taxation.

When the CFCs participate in relevant mining projects, the following should be observed as a basis for granting tax exemption: the CFC is one of the parties to the contract, including: concession, license, as well as on the basis of production sharing agreement, or other types of contracts based on risk conditions. In this case, the foreign state (territory) or the government, as well as an institution authorized by it (for example, a state corporation) should be the other side of the concluded agreements. At the same time, there is an additional condition in the tax law regarding the application of the CFC income tax exemption: the share of income received in connection with participation in agreements for the period of preparation of financial statements for a financial year should be more than 90% of the total CFC income, as well as if there are no incomes for the relevant period in the financial statements, or consist of the amount of income in the form of exchange differences received or income not accounted for by their individual types, taking into account tax legislation.

It should be noted that the general terms and conditions of the tax law for exemption of the CFC from income taxation contain a closed list. If the CFC does not fit one of the criteria, then the controlling person is obliged to

pay tax on the profit received by the corresponding CFC. In order to apply tax exemption for any of the above reasons, the controlling person must submit to the tax authority at the place of location the documents confirming compliance with the conditions for exemption, translated into the national language of the jurisdiction in the part required for verification, together with the CFC notification in a timely manner. According to written explanations of the Federal Tax Service of Russia, the following is a valid list of supporting documents:

1) tax reporting of the CFC (Lehoux, 2018);
2) calculation of the effective income (profit) tax rate of the CFC and the weighted average corporate tax rate;
3) certificate of tax residence of the CFC for the corresponding period.

In juridical doctrine, the scope of application of exemption for CFCs' profits from taxation is considered one of the riskiest. Despite the fact that the legislative level provides a wide list of grounds for the exemption from taxation of the CFC's profits, in practical terms, there are a number of problems in the application of legal grounds. First of all, the taxpayers are required to calculate the effective tax rate in the country of their location equal to at least 75% of the Russian average weighted income tax rate. At the same time, according to the findings of Carruthers (2020), there is a contradictory opinion in the practical activity of controlling persons. For example, if such a person located in Germany applies a basic tax rate of more than 20%, then, when calculating the weighted average, the excess of 75% of the 20% income tax rate in national jurisdiction will be 75% ≈ 15%. Therefore, if the current tax rate in the country of location is approximately 15%, in this country the general income tax rate will be approximately the same number of percent, therefore, it is possible to apply exemption for such a company (Lampert, 2013). At the same time, the logic of such reasoning lacks the essential detail – the rate should be "effective". For example, in Switzerland, a different procedure is applied to provide benefits to individual companies, and the performance criterion is less than 15% (Seo, 2020).

Another controversial practical aspect is related to the exemption grounds for active foreign companies with passive income of at least 20% of their total income, or to subholding companies. The attention should be paid to the fact that tax legislation does not contain a definition of the "active income" concept. It may be advisable to follow logically from the opposite, i.e. to define it through the concept of passive income, and, which is extremely important, through the unclosed list of features. One way or another, the above legal norm contains standard varieties of passive income, including: interest, dividends, income from shares, income from the sale of shares in shares, income in the form of a liquidation premium, and royalties. It should be understood that if royalties with interest in aggregate account for more than 80% of the company's income, then such a company is not automatically considered an active foreign company; therefore, its profit is subject to income taxation according to the rules of national jurisdiction.

The list of such expense as the certain types of passive income, in particular, the income from the provision of services (more related to R&D, as well as development, research in the scientific field, marketing promotion services), rent, etc., may be open, and the main danger lies in the current wording "other ... similar income". Therefore, the tax risk lies in the fact that even if the CFC is engaged in the provision of any of the services mentioned above, for example, related to scientific studies of the activity of the drug, which then can lead to the sale of this drug in the territory of national jurisdiction, then anyway the fact of obtaining income from research activities may lead to the qualification of this income as passive, and here the legislatively established percentage boundaries should be taken into account.

Moreover, the amount of passive dividends that are not included in the calculation of income excluded on the basis of the granted exemption of the active foreign subholding companies relates to income from active foreign companies. At the same time, in this situation, the residents do not belong to foreign companies. Consequently, a resident acting as a subsidiary of a Cypriot organization will not meet the characteristics of an active foreign

company. Therefore, the indicated exemption will not be applicable if the dividends are received from the operating companies of national jurisdiction as the main income of a foreign company, therefore, the taxpayers have the right to defend their interests in court.

Analysis of the practice of tax regulation of legal acts in the EU countries
In the analytical part of the scientific study, it is important to analyze the existing problems arising from the legal regulation of the taxation of the CFCs in the countries of the European Union, based on the analysis of judicial practice, especially vivid, notable court decisions. Given the imbalance due to differences in existing EU law and the general rules governing CFC taxation (Gidirim, 2016), the case law of Cadbury Schweppes plc and Cadbury Schweppes Overseas Ltd v Commissioners of Inland Revenue should be reviewed. The precedent for the tax dispute is the following practical situation: the confectionery company Cadbury Schweppes (now in civil circulation under Cadbury plc) with a head office in London (the parent company) has established a number of subsidiaries in Ireland. However, these companies carried out financial activities without having an office or a staff of employees and also with no telephone communications. At the same time, in 2006, Ireland had a tax incentive that established a reduced tax rate of 10% of the company's profits, while in the UK the main tax rate was at least 30%. Thus, Cadbury Schweppes, in fact, carried out a tax optimization of its business.

The UK tax authorities, acting as the plaintiff, raised the issue of application of the CFC rules to the subsidiaries. In turn, Cadbury Schweppes, acting as the defendant, referred to economic freedoms within the framework of the EU Member States in the course of the lawsuit. At the same time, the judicial authorities accepted the defendant's position, noting the incorrectness of considering the level of taxation as the application of criteria to resolve the controversial issue of the applicability of the CFC rules within the EU. At the same time, as noted in the court decision, there is a situation in which it is possible to limit the entrepreneurial freedom of the company in the event of imitating economic activity and provided that the sole purpose is intentional tax evasion. In this regard, the position of the court is among the precedents in the field of international practice of CFC taxation.

Another landmark court decision for the EU in the field of research issues is the case "Vodafone 2 v. RCC". First of all, it is worth noting that Vodafone was (and is for the current tax period) one of the largest mobile operators. The case was heard in British and European courts. Initially, Vodafone sued for suspension of additional verification of the tax return. Its subsidiary was located in Luxembourg, and UK tax authorities were exploring the feasibility of applying British internal CFC tax rules. In turn, Vodafone referred to the case-law of Cadbury Schweppes and tried to prove that the CFC rules are applicable only in the case of circumvention or deliberate fraud of the tax system using various schemes. At the same time, the court of appeal agreed with the plaintiff Vodafone, taking into account the precedent and, thereby, confirming the conclusions about the inapplicability of the internal rules of the CFC to the CFC established and operating in another state. However, the court's opinion was narrower than the conclusions drawn in the Cadbury Schweppes case. So, from the standpoint of the judges, not all CFC incomes are subject to protection against taxation, but only in terms of the value added by the employees. Thus, the British court set itself a broader task: to correlate the findings of the Cadbury Schweppes precedent with the answer to the question of the possibility of exemption from the CFC rules at the level of the parent company of a subsidiary established within the EU. Having identified such a contradiction, the judges formed the following scenarios:
(1) to return the case again to the European Court, or
(2) to upgrade the existing CFC regulations (Delgado, 2017).

The correctness of the entrepreneurial freedom violation on the basis of counteraction to tax evasion is the key problem of European legal doctrine. As a rule, the Cadbury Schweppes case and the similar Columbus Container Services BVBA & Cov. Finanzamt Bielefeld-Innenstadt case is analyzed. It follows from the first of these cases that in the EU it is quite natural that the company seeks to optimize its operations in order to find a lower tax rate.

However, these actions do not indicate tax evasion (Yemelyanov et al., 2019). At the same time, the court needs to find out whether the CFC actually carries out the entrepreneurial activity in the country of its incorporation. The answer to this question depends on the resolution of the basic question of the applicability of the internal rules of the CFC profits taxation. As for the second of these trials, here the court evaded a direct answer to the analyzed question, thereby making narrower the analysis of the fact of discrimination. Therefore, this lawsuit did not become a precedent in deciding which of the tax principles prevails: territorial or global (Monsenego, 2012).

Thus, it is important to focus on the identified and relevant for the EU problem of the applicability of the internal national taxation rules for the CFC, which operates and is incorporated in the EU member state, but not at the place of incorporation or operation of the parent company. At the same time, there are other precedents in international legal practice that gives rise to unresolved issues, since the specifics of the current EU regulatory legislation in a particular state are not fully taken into account.

5. Results

Based on the example of one of the jurisdictions, let us carry out a correlation analysis of the tax base and tax rates, the results of which will make it possible to conclude that they are dependent. For the purposes of the study of the specifics of the CFC taxation, taking into account the current provisions of the Tax Code of the Russian Federation, regulating the procedure for accounting for the profits of CFCs in a general manner, non-operating incomes were also included in the composition of the income received. This procedure is general in tax base calculation for income tax for the taxpayers and Russian companies. In this case, the date of income to determine the CFC's profit is the end date of the period for which financial statements for the financial year are prepared on the basis of the law of the location (registration) of the unincorporated foreign company or structure (hereinafter – the UFC). In the event that the date can be determined by the personal law of the CFC, the date of receipt of income is recognized on December 31 of the year following the current tax period. If the personal law of the CFC does not imply an obligation to provide financial statements, the date of recognition of income will be December 31 of the current tax period, the last of which is the end date of the corresponding financial period.

In this regard, with the entry into force of tax legislation in 2015, in general, 2016 became the first year for the taxpayers to include the CFC's profit in the tax base, with mandatory inclusion of the CFC's profits for 2015, if the personal law of such a company required the preparation of a financial report for the current tax period. In particular, the annually updated tax return on income tax for the period of 2019 when calculating the income received in the form of profits of the CFC includes a separate appendix containing detailed transcripts by categories of taxpayers (Fig. 3).
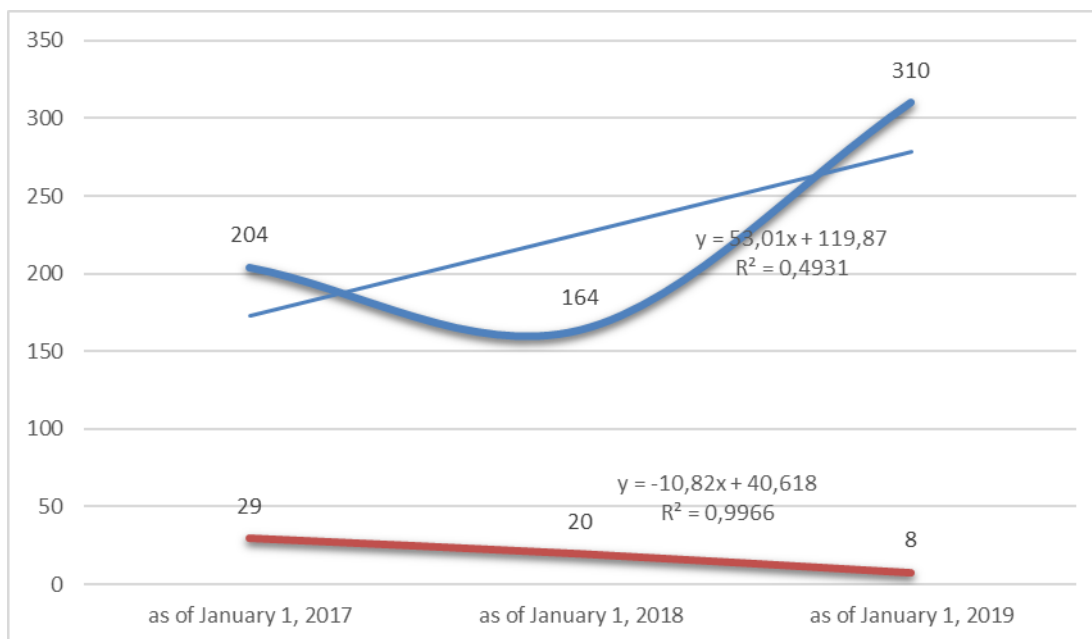
Figure 3. Comparative dynamics of CFC activities in national jurisdictions in calculating the number of companies to the tax base
Source: The authors' research based on the data of https://www.nalog.ru/rn77/related_activities/statistics_and_analytics/forms/

It should be noted that when studying the average for the tax period number of CFCs operating under the personal law as of January 1, 2018, it decreased to 164 units, and over the next tax period the growth was 310 units.

In this case, the physical volume of the growth rate of the tax base as of January 1, 2019, compared to the same period as of January 1, 2017, was 32%, and the increase in the number of the CFCs operating under personal law for similar periods was 52%. The results obtained on the basis of the analysis of the influence of the tax bases on the CFCs under study showed a strongly pronounced linear relationship with a correlation coefficient equal to -0.93.

This approach is characterized by the following important circumstance: financial corporations are no longer attracted by the option of being in a national jurisdiction, and they focus more on other jurisdictions, including low-tax or offshore ones.

In turn, the dynamics of the number of the CFCs operating according to the rules established by national legislation showed a negative trend. At the same time, with regard to determining the tax base of controlling persons for the income in the form of profit received, the basic tax rate of 20% is applied. However, the tax base for calculation does not include the expenses received from other activities and the amount of losses incurred in relation to the activities of the controlling entities themselves. Moreover, the entire amount of the calculated tax is subject to transfer to the federal budget, without its distribution as for the main category of taxpayers. This involves payment of 3% of the income tax to the federal budget and 17% of profit payable to the budgets of the subject of the Russian Federation. The following documents are recognized as supporting and confirming the value of the calculated tax base and calculated tax:
   1) the income tax return and its annexes;
   2) the financial statements of the CFC for the relevant period and the audit report on these statements.

At the same time, this procedure is justified either by personal law or by constituent documents, in which a mandatory audit is established, including on a voluntary basis. Moreover, such documents of a foreign company must be translated into Russian.

In addition, certain clarifications of the Ministry of Finance of Russia contain an additional indication that the following can be used as supporting documents: the extracts from the CFC settlement accounts, primary documents confirming the operations performed in accordance with the company's business practices, etc. It should be noted that in relation to confirmation of the amount of the CFC profit received by the foreign entity the following provision is a general trend. If the Russian Federation does not conclude an international tax treaty with a specific country, then supporting documents must be certified by the competent tax authority of the respective country. In turn, when submitting supporting documents to the Russian tax authorities in a general manner, there is no obligation to notarize or apostille them. At the same time, an important condition in the evolution of accounting for the criterion indicator of profit received by the CFC in determining the tax base and the corresponding tax amount for 2015 and 2016 was the establishment of a threshold value for the tax period of more than 400 thousand euros, and a decrease in the minimum value up to 140 thousand euros in subsequent periods. Moreover, in order to determine the sum criterion, the amount of dividends paid on such a controlled company (distributed profit) is not taken into account. At the same time, if the minimum value of the sum criterion has not been exceeded, information on the amount of profit (loss) received on the CFC must be presented in the income tax declaration.

It should be noted that if the minimum size of threshold values is not exceeded by the CFC, the tax return must be filled in according to the simplified procedure, and in the case of loss, this provision cannot be applied. When identifying the features of the procedure for calculation and payment of the CFC's income, it is important to pay attention to the procedure for such an option when CFCs are registered in offshore jurisdictions.

In this case, using a general approach, the taxpayers either determine the profit received by the CFC on the basis of the financial statements within the same financial year of the company or carry out the calculations based on the provisions of the Tax Code of the Russian Federation. In this case, the rules apply to legal entities operating in the country. Therefore, if such CFCs are registered in offshore jurisdictions and the information on them does not contain data on the submitted statements, in this case, the controlling person is obliged to apply the provisions of the Tax Code of the Russian Federation. Thus, for such cases, there is no right to choose.

It should be noted that, as a general rule, the selected method of calculation and payment of the CFC income involves the actions of the taxpayer, namely: recording in the accounting policy for taxation purposes (for Russian organizations) and application to a specific CFC for at least five subsequent calendar years (tax periods). As a general rule, the accounting policy of the company for taxation purposes should contain an approved list of primary documents, on the basis of which the size of the CFC profit is calculated if they are applicable to the provisions of the Russian tax law and the company does not have financial statements. At the same time, on the practical side of the issue, such regulation of the list seems appropriate: the taxpayer can subsequently remove potential risks in demanding by the fiscal authorities of the documentation that is not used in principle in this CFC.

At the same time, tax legislation also provides for a reduction in the amount of the tax calculated in relation to the income received by the CFC. In these cases, it is subject to reduction in proportion to the share of the controlling person by the amount of the calculated tax amount in relation to:
1) income received (in relation to the Russian and foreign legal field of law);
2) income received of the permanent representative office of the CFC located in the Russian Federation.

The study of the growth rate of the tax base and the calculated amount of tax payable to the budget in relation to the profits received by the CFC to the budget of the Russian Federation was conducted on the basis of statistical data of the Federal Tax Service of Russia for the tax periods 2016-2018 (Fig. 4).
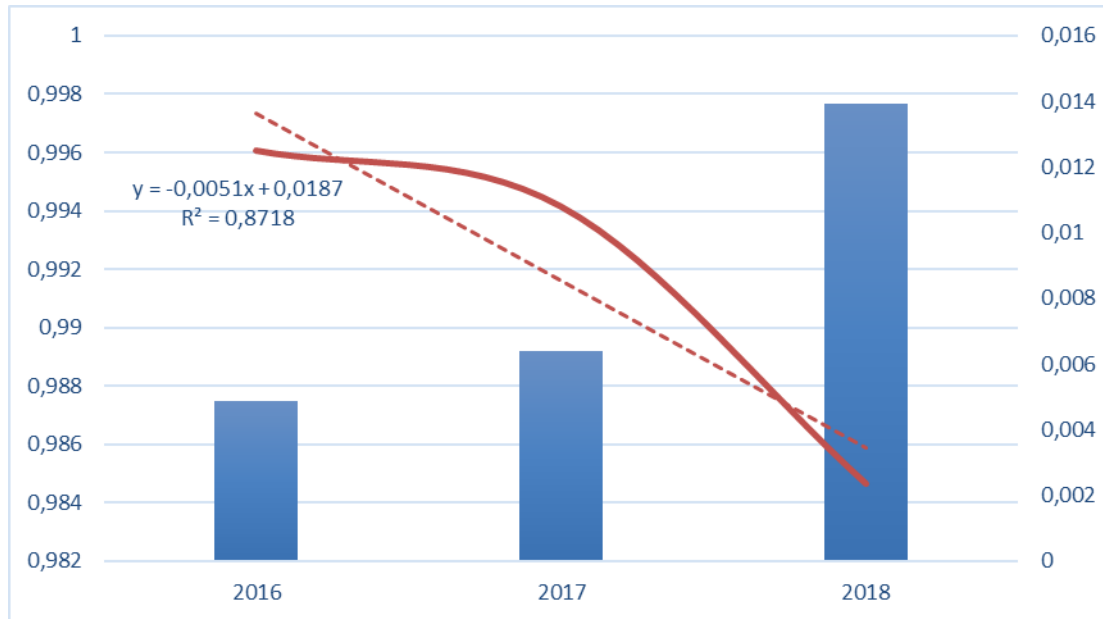
Figure 4. Comparative characteristics of the growth rate of the tax base and the amount of tax payable to the budget in relation to the CFC income payable
Source: The authors' research according to (nalog.ru, 2020)

The analysis of statistical data for the tax periods of 2016-2018 made it possible, based on a comparison of the tax bases for calculation of the CFC tax and tax payable, to determine the actual tax rate in the following limits:
- for the CFCs, the income of which is determined according to financial reporting compiled by their personal law:
  - ✓ 6% for 2016;
  - ✓ 7% for 2017;
  - ✓ 5% for 2018;
- for the CFCs, the income of which is determined by the rules of national law:
  - ✓ 20% for 2016;
  - ✓ 18% for 2016;
  - ✓ 17% for 2016;

A correlation analysis revealed a strongly pronounced linear relationship between the tax base and the tax rates; however, in the case of CFCs, which are primarily subject to national legislation, the correlation coefficient was +0.89, which characterizes the economic trend towards a reduction in financial investments, despite the decrease in the actual tax rate. In turn, for CFCs, whose activities are regulated to a greater extent by foreign legislation, the correlation coefficient amounted to a value of -0.93, which is characterized by a reflection of the greater economic effect of lowering the actual tax rate in the following scenario: a reduction in the tax rate represents more financial injections into the national jurisdiction.

6. Discussion

First of all, it should be noted that, as part of a scientific study, one of the important tasks is to understand the theoretical aspects and practice in the specifics of supranational legal regulation of CFCs' income taxation in the countries of the European Union (Gootjes, 2020). At the same time, for quite a long time, there has been a clear tendency in the legal regulation in the field of taxation in the EU member states aimed at phasing out tax sovereignty within the framework of the united pan-European doctrine and economic community, represented primarily by transnational corporations (Baudot, 2020).

At the same time, at the level of the opinions of individual economists such as Kneller (2014) and Hathikal (2020), the recommendations contained in scientific studies in the form of separate proposals for establishing special tax regimes for certain categories of taxpayers in those EU member states in which the current maximum corporate income tax rates exceed their average values were repeatedly presented. In particular, such states include Austria and Belgium. This circumstance can be considered as a pronounced tax competition regarding the application of direct taxes in the EU member states (Linaa, 2020).

At the same time, the general approach to harmonization in the EU countries relates mainly to indirect taxation (Thanou, 2020). Accordingly, the current direct taxes are incorrectly attributed to them. At the same time, from a legal point of view, the current fact of a particular country's membership in the EU fully contains the obligations to formulate the norms of national tax legislation, including the scope of regulation of corporate taxation in relation to the CFCs (Biggeri, 2017). In this regard, the adoption of a package of regulatory legal acts by the European Commission in 2016 was characterized by a desire to build a unified system of corporate taxation. In this regard, it can be noted that this circumstance is fully similar to the current order of practical experience in building an indirect taxation system, and above all, VAT. In this regard, it can be noted that over the past few years, the pan-European course on tax integration is aimed at:
1) the functioning of a single consolidated corporate tax base (Nakamura, 2018);
2) taking into account the current OECD recommendations regarding the application of the provisions on BEPS (base erosion and profit shifting) (Majumder, 2020), which is also guaranteed by the taxation of the profits of the CFC subject to a number of conditions.

It should be noted that after the formation of a specific Brexit policy, the issues of general tax integration began to be more widely discussed, including the elements of legal emphasis (Perrone, 2020), taking into account the positive adoption of existing rules by the EU member states (Gozubuyuk, 2020). The reason for this policy was a peculiar approach from the UK, which conditionally agreed with the main motive of the BEPS plan, but rejected the general tax integration with the EU member states.

Conclusion

Based on the results of the study, it can be concluded that, in general, the current path for the development of tax legislation in most countries is typical from the perspective of the current legal regulation of CFCs. At least, three directives of the Council of the European Communities (EU Council) should be noted which are currently the legal tools for the legal regulation of the CFCs. First of all, the effect of EU Council Directive 90/435/EEC should be mentioned, which includes provisions that are characteristic of the entire taxation system of parent companies of EU member states and their subsidiaries. At the same time, on the basis of this directive, the tax on dividends for such organizations was canceled. In turn, the practical application of the EU Council Directive 2009/133/EEC, which replaces the previously effective Directive 2003/49/EU, taking into account the existing provisions, is aimed at the transfer of assets and the exchange of shares of companies that are tax residents of several national jurisdictions within the EU. At the same time, in terms of the application of the CFC, the effect of the Council

Directive 2003/49/EC should be mentioned, on the basis of which all processes related to the taxation of interest and royalties paid by associates within the jurisdiction of the EU countries use a direct prohibition on taxation directly in relation to the intragroup calculated amounts of interest and royalties, as well as the payments made on dividends. Meanwhile, the current EU legal doctrine, under the influence of Brexit, in the medium term can influence the adoption of additional directives in the field of corporate taxation, since it is the United Kingdom that remains a key financial center of the EU, where an unprecedented (on the EU scale) amount of the CFCs operate, which in turn provide direct investment in the EU, and therefore make a significant share in the form of foreign direct investment in the EU (Permikin, 2018). Thus, taking into account the circumstances, the following situation may arise in the practice of international taxation: a European subsidiary paying dividends (or interest) to the parent company operating in the UK. The following practical aspect arises: the ability or inability of such a company to refer to existing directives in order to exempt the dividends from taxes. It should be understood that in the case of a positive answer to the question, the problem of double taxation of the amount of dividends received (or interest payments, or royalties) both from the UK in the EU and vice versa under the Brexit conditions arises. This problem is the most vulnerable since the tax period of 2021.

Further, it is important to pay attention to the following fact. Against the background of the unification of tax rules in the EU, which is quite consistent and successful in specific areas, the issue of inconsistency of the rules of CFCs in the national jurisdictions of the EU member states remains unresolved. This fact raises a challenging and quite logical question: if the EU has a common economic and legal space, then how legitimate is the application of the general CFC regime, since taking into account fundamental European economic freedoms, which, in particular, are enshrined in the OECD Model Double Taxation Convention on Income and Capital, the admissibility of the CFC internal rules to various external challenges within the EU is a controversial practical issue. Nevertheless, the state is trying to bridge the current gap in the practical plane of taxation. In particular, in 2015, a special Report "Designing Effective Controlled Foreign Company Rules" was adopted. These rules contain a provision on the need to develop the uniform, unified CFC rules while preserving the freedom of the EU member states to develop their own provisions that take into account national specifics. At the same time, a uniform approach in the field of legal regulation of CFCs in the EU countries is manifested in most of its states on the basis of provisions that define (1) the concept of CFCs, and (2) the controlling person, as well as (3) the procedure for determination and imposition of such CFC income. In the authors' opinion, this approach will contribute to the preservation of the sovereignty of the tax bases.

References

Aburto, L. & Weber, R. (2007). Improved supply chain management based on hybrid demand forecasts. *Applied Soft Computing*, 7(1): 136-144. https://doi.org/10.1016/j.asoc.2005.06.001

Aggarwal, R., Erel, I., Ferreira, M., & Matos, P. (2011). Does governance travel around the world? Evidence from institutional investors. *Journal of Financial Economics*, 100(1): 154–181.

Akamah, H. T., Hope, O.-K., & Thomas, W. B. (2018). Tax havens and disclosure aggregation. *Journal of International Business Studies*, 49(1): 49–69.

Akhmadeev, R.G., Bykanova, O.A. & Salomadina, P.S. (2019). The effect of the VAT change on the final consumer. Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, 765-770.

Akhmetshin, E. M., Plaskova, N. S., Iusupova, I. I., Prodanova, N. A., Leontyev, A. N., & Vasilev, V. L. (2019). Dataset for determining rational taxation value with incompatible criteria of economic efficiency and equity. *Data in Brief*, 26 https://doi.org/10.1016/j.dib.2019.104532

Almunia, M. & Lopez-Rodriguez, D. (2018). Under the radar: The effects of monitoring firms on tax compliance. *American Economic Journal: Economic Policy*, 10(1): 1–38. https://doi.org/10.1257/pol.20160229

Arner, D.W., Buckley, R.P. & Zetzsche, D.A. (2020). Sustainability, FinTech and Financial Inclusion. *European Business Organization Law Review*, 21: 7–35 https://doi.org/10.1007/s40804-020-00183-y

Arregle, J. L., Miller, T. L., Hitt, M. A., & Beamish, P. W. (2016). How does regional institutional complexity affect MNE internationalization? *Journal of International Business Studies*, 47(6): 697–722. https://www.jstor.org/stable/43907604

Baudot, L., Johnson, J.A. & Roberts, A. (2020). Is Corporate Tax Aggressiveness a Reputation Threat? Corporate Accountability, Corporate Social Responsibility, and Corporate Tax Behavior. *Journal of Business Ethics*, 163: 197–215. https://doi.org/10.1007/s10551-019-04227-3

Bertrand, O. & Capron, L. (2015). Productivity enhancement at home via cross-border acquisitions: The roles of learning and contemporaneous domestic investments. *Strategic Management Journal*, 36(5): 640–658. https://doi.org/10.1002/smj.2256

Biggeri, L., Ferrari, G. & Yanyun, Z. (2017). Estimating cross province and municipal city price level differences in China: some experiments and results. *Social Indicators Research*, 131(1): 169-187. https://doi.org/10.1007/s11205-016-1238-0

Bykanova, O.A., Akhmadeev, R.G., Glubokova, N.Y. & Kravchuk, I.S. (2018). The global market of roundwood: Financial aspects. *Bulgarian Journal of Agricultural Science*, 24(1): 8-16. https://www.agrojournal.org/24/01-02.pdf

Carruthers, B.G. (2020) Law, governance, and finance: introduction to the Theory and Society special issue. *Theory and Society*, 49: 151–164. https://doi.org/10.1007/s11186-020-09390-5

Delgado, M. S. & McCloud, N. (2017). Foreign direct investment and the domestic capital stock: The good-bad role of higher institutional quality. *Empirical Economics*, 53(4): 1587–1637.

Eshuis, J., E.-H. Klijn & Braun, E. (2014). Place marketing and citizen participation: Branding as strategy to address the emotional dimension of policy making? *International Review of Administrative Sciences*. 80 (1): 151–171.

Garnov, A. P., Garnova, V. Y., Prodanova, N. A., Khudyakov, S. V., & Zatsarinnaya, E. I. (2020). Digitalization of the economy: Problems and prospects. Journal *of Critical Reviews*, 7(7): 442-444. https://doi.org/10.31838/jcr.07.07.76

Gidirim, V.A. (2016). Basics of international corporate taxation. *Person of the word*, 1(2): 91-102.

Gootjes, B., de Haan, J. & Jong-A-Pin, R. (2020). Do fiscal rules constrain political budget cycles?. *Public Choice*. https://doi.org/10.1007/s11127-020-00797-3

Gozubuyuk, R., Kock, C.J. & Unal, M. (2020). Who appropriates centrality rents? The role of institutions in regulating social networks in the global Islamic finance industry. *Journal of International Business Studies*, 51: 764–787. https://doi.org/10.1057/s41267-018-0202-4

Grossule, E. (2020) Risks and Benefits of the Increasing Role of ESMA: A Perspective from the OTC Derivatives Regulation in the Brexit Period. *Social Indicators Research*, 131(1): 169–187 https://doi.org/10.1007/s11205-016-1238-0

Hampl, M. & Havranek, T. (2020). Central Bank Equity as an Instrument of Monetary Policy. *Comparative Economic Studies*. 62, 49–68. https://doi.org/10.1057/s41294-019-00092-1

Hathikal, S., Chung, S.H. & Karczewski, M. (2020). Prediction of ocean import shipment lead time using machine learning methods. *SN Applied Sciences*. 2, 12-72. https://doi.org/10.1007/s42452-020-2951-5

Huang, J.-R. & M.-L. Chang (2018). Fiscal transparency and foreign direct investment in China. *The Singapore Economic Review*, 63(4): 839–859.

Iurkov, V.& Benito, G. R. (2018). Domestic alliance networks and regional strategies of MNEs: A structural embeddedness perspective. *Journal of International Business Studies*, 49(8): 1033–1059. https://biopen.bi.no/bi-xmlui/bitstream/handle/11250/2574221/Domestic%20alliance%20networks%202018.pdf?sequence=4

Judicial decisions. Cadbury Schweppes plc and Cadbury Schweppes Overseas Ltd. v. Commissioners of Inland Revenue (Case C-196/04), September 12, 2006. EUR-Lex. URL: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A62004CJ0196

Judicial decisions. Vodafone 2 v. RCC (2009) EWCA Civ 446 (CA). British and Irish Legal Information Institute. URL: http://www.bailii.org/ew/cases/EWCA/Civ/2009/446.html

Judicial decisions. C-298/05 Columbus Container Services BVBA & Co v. Finanzamt Biele-feld-Innenstadt (2007) // ECR I-10451 (ECJ). URL: http://curia.europa.eu/juris/liste.jsf?language=en&num=C-298/05

Kneller, R. & Misch, F. (2014). The effects of public spending composition on firm productivity. *Economic Inquiry*, 52(4): 1525–1542. https://doi.org/10.1111/ecin.12092

Korableva, O. N., Kalimullina, O. V., & Mityakova, V. N. (2018). Innovation activity data processing and aggregation based on ontological modelling. Paper presented at the 2018 4th International Conference on Information Management, ICIM 2018, 1-4. https://doi.org/10.1109/INFOMAN.2018.8392659

Kosov, M.E., Akhmadeev, R.G., Bykanova, O.A., Osipov, V.S., Ekimova, K.V. & Frumina, S.V. (2016). Economic practicability substantiation of financial instrument choice. *Journal of Applied Economic Sciences*, 11(8): 1613-1623

Lampert, S., Bittermann, J-N. & Harms, B. (2013). The CFC Regime in Germany. *European Tax Studies*, 20: 20-33.

Lehoux, L., Morozova, T.V., Safonova, E.G. & Kalacheva, O.N. (2018). Adaptation of individual taxonomy in financial statements prepared in line with IFRS to XBRL format. Proceedings of the 32nd International Business Information Management Association Conference, IBIMA 2018 - Vision 2020: Sustainable Economic Development and Application of Innovation Management from Regional expansion to Global Growth, 2048-2055.

Linaa, J. (2020). Danish is as Danish does: Negotiating Ethnic Identities in Early Modern Elsinore, Denmark. *International Journal of Historical Archaeology*, 24: 284–317. https://doi.org/10.1007/s10761-019-00510-1

Lehoux, L., Morozova, T.V., Safonova, E.G., Balashova, A.D., & Protasov, M.V. (2019). Practical Aspects in Calculating of Impairment of Financial Assets According to IFRS 9 "Financial Instruments". Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, 6624-6632.

Majumder, A. & Ray, R. (2020). National and subnational purchasing power parity: a review. *Decision*, 47: 103–124. https://doi.org/10.1007/s40622-020-00245-7

Monsenego J. (2012). Taxation of Foreign Business Income within the European Internal Market. *Doctoral Series*, 2(22): 160–170

Morozova, T.V., Akhmadeev, R.G., Bykanova, O.A. & Philippova, N.V. (2019). Harmonizing the valuation standards of the EEU agricultiral companies. *International Journal of Recent Technology and Engineering,* 8(1), 2167-2177 https://www.ijrte.org/wp-content/uploads/papers/v8i1/A1942058119.pdf

Nakamura, L. (2018). Creativity and economic growth: Theory, measures, and potentials for Morocco. *Journal of Intellectual Capital*, 19(3): 480–486.

Nigamaev, A. Z., Gapsalamov, A. R., Akhmetshin, E. M., Pavlyuk, A. V., Prodanova, N. A., & Savchenkova, D. V. (2018). Transformation of the tax system during the middle ages: The case of Russia. *European Research Studies Journal*, 21(3), 242-253.

Permikin, K.I. (2018). Features of the supranational regulation of the controlled foreign companies profit taxation in the European Union. *Problems of economics and legal practice*, 3(4): 264-285.

Perrone, A. (2020) EU Market Abuse Regulation: The Puzzle of Enforcement. *European Business Organization Law Review*, 21: 379–392. https://doi.org/10.1007/s40804-019-00171-x

Petrova, G., Posadneva E. & Morozova T. (2019). Leading the Labour Market by the Laws of Supply and Demand. In: Strielkowski W. (eds) Sustainable Leadership for Entrepreneurs and Academics. Springer Proceedings in Business and Economics. Springer, Cham, 263-271

Prodanova, N. A., Trofimova, L. B., Korshunova, L. N., Kamolov, S. G., Trapaidze, K. Z., & Pavlyuk, A. V. (2019). The methods and evaluation of RIC integrated business indicators. *International Journal of Innovative Technology and Exploring Engineering*, 8(10), 1889-1894. https://doi.org/10.35940/ijitee.J9242.0881019

Puryaev, A. S., Puryaeva, Z. A., Kharisova, A. R., & Puryaev, A. A. (2019). Investigation and explanation of mathematical tooling for accounting non-economic characteristics during the investment project effectiveness' assessing process. *IOP Conference Series: Materials Science and Engineering*, *570*, 012074. https://doi.org/10.1088/1757-899X/570/1/012074

Rahman, P. A., Bobkova, E. Y. (2016). Reliability model of fault-tolerant data processing system with primary and backup nodes. IOP Conference Series: Materials Science and Engineering, 124(1), 148-156.

Sangiovanni, A. (2013). Solidarity in the European Union. *Oxford Journal of Legal Studies*, 33(2): 213–241.

Sazanov, O. V., & Akhmetshin, E. M. (2016). Tax monitoring as an alternative to existing forms of tax control in Russia. *Journal of Economics and Economic Education Research*, 17(SpecialIssue), 15-20.

Seo, E., Kang, H. & Song, J. (2020). Blending talents for innovation: Team composition for cross-border R&D collaboration within multinational corporations. *Journal of International Business Studies,* 51: 851–885. https://doi.org/10.1057/s41267-020-00331-z

Thanou, S. (2020). Individual restrictive measures and actions for damages before the General Court of the European Union. *ERA Forum.*20: 599–614. https://doi.org/10.1007/s12027-019-00592-8

The Federal Tax Service. Data on forms of statistical tax reporting. https://www.nalog.ru/rn77/related_activities/statistics_and_analytics/forms/

Turishcheva T., Akhmadeev R., Bykanova O. & Nastasyuk N. (2020). Methodological Support for Internal Control of Autonomous Institutions. *International Journal of Applied Exercise Physiology*. 9 (4): 53-61

Vertakova, Y., Mkrtchyan, V., & Leontyev, E. (2019). Information provision of decision support systems in conditions of structural changes and digitalization of the economy. *Journal of Applied Engineering Science*, 17(1), 74-80.

Yemelyanov, V. A., Nedelkin, A. A., & Olenev, L. A. (2019). An object-oriented design of expert system software for evaluating the maintenance of lined equipment. Paper presented at the 2019 International Multi-Conference on Industrial Engineering and Modern Technologies, FarEastCon 2019, https://doi.org/10.1109/FarEastCon.2019.8934414

Liudmila Ivanovna KHORUZHY
Doctor of Economics, Professor, the Head of the Department of Economics and management in agribusiness
Research interests – accounting expertise, financial control, audit, financial reporting in accordance with sustainable development, management accounting
ORCID ID: http://orcid.org/0000-0003-3061-1374

Malvina Rasulovna KARABASHEVA
Associate prof. of the accounting, analysis and audit department of the Financial University under the Government of the Russian Federation, Moscow, Russian Federation. Research interests – accounting expertise, state financial control, budgetary establishments, departmental interaction, efficiency of activity.
ORCID ID: https://orcid.org/0000-0003-3728-9867

Hafis Ahmed oglu HAJIYEV
PhD in Economics, Associate professor, Department of "Accounting and Audit", Faculty of "Finance and accounting", Azerbaijan State University of Economics (UNEC). Author specializes in the study of issues of improving accounting and the reporting in agricultural organizations. Currently engaged in teaching financial and management accounting at the Faculty "Finance and accounting" UNEC.
Research interests: Financial accounting, Financial statements, IFRS, Tax, Business.
ORCID ID: https://orcid.org/0000-0003-0805-8058

Natalia Nikolaevna ZHADOBINA Ph.D. (Law.), Associate professor, Department of State and Municipal Law, Surgut State University. Expert in the field of state and municipal law. Research interests: Municipal law, Financial right, Tax law, Banking law, Municipal power: legal support.
ORCID ID: http://orcid.org/0000-0003-1720-6163

Natalia Andreevna ALEKHINA
Ph.D. of economics, Associate Professor at the Department of regulatory affairs in the sphere of drugs products and medical devices at Federal State Autonomous Educational Institution of Higher Education I.M. Sechenov First Moscow State Medical University of the Ministry of Health of the Russian Federation (Russian Federation, 119146, Moscow, Bolshaya Pirogovskaya str., 19/1, e-mails: romakinan@gmail.com , alekhina.na@1msmu.ru
ORCID ID: http://orcid.org/0000-0002-0356-7200

Rustem Adamovich SHICHIYAKH
Ph.D. (Econ.), Associate professor, Department of Management, Kuban State Agrarian University named after I.T. Trubilin. Expert in the field of state regulation of agriculture and sustainable tourism development. Research interests: state regulation of the economy, agriculture, sustainable development of tourism, rural areas, management, human capital, entrepreneurship
ORCID ID: http://orcid.org/0000-0002-5159-4350

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

INDICATORS OF STRATEGIC INTUITION FOR SMEs' ENTREPRENEURS: EVIDENCE FROM THAILAND[*]

**Somnuk Aujirapongpan [1*], Yaninee Songkajorn [2], Yuttachai Hareebin [3],
Sirichai Deelers [4], Jaturon Jutidharabongse [5]**

[1,2,5] School of Management, Walailak University, Nakhon Si Thammarat, 80160, Thailand
[3] Faculty of Management Science, Phuket Rajabhat University, Phuket, 83000, Thailand
[4] Faculty of Management Science, Silpakorn University, Petchaburi, 76120, Thailand

E-mails:[1] asomnuk@wu.ac.th (Corresponding author); [2] yaninee_IMM@yahoo.ca; [3] yuttachai.mas@gmail.com;
[4] sirichai@ms.su.ac.th; [5] cjaturon@wu.ac.th*

Abstract. The main objective of this research is to study and develop the strategic intuition indicators of small and medium-sized enterprises (SMEs) in Thailand. The results will serve as a guideline for creating a model to develop the strategic intuition capability of entrepreneurs in Thailand in the future. The research studies relevant literature from empirical data and tests the consistency of a linear structural relationship model by using component analysis techniques. A questionnaire was used to collect data from a sample of entrepreneurs who are SMEs from the database of the Thailand Exporter Directory, the Ministry of Commerce. The results showed that the developed strategic intuition model is in harmony with empirical data, with the strategic intuition variables consisting of three main components: (1) Sensing capabilities, (2) Aggressive thinking capabilities, and (3) Strategic decision capabilities, with a positive value. It was also found that in each component of the measurement model, strategic insight had the same straightness, and the variability of the structural confidence values passed the standard criteria.

Keywords: strategic intuition; intuition indicator; entrepreneurs; SMEs; Thailand

1. Introduction

Nowadays, the road to either success or failure in business operations depend on entrepreneurs' decision-making (Simon, 1997; Robbins, 2003). Hence, in the 21st century, the most successful and innovative entrepreneurial leaders will focus on sustaining superior performance, strategies, and foresight and learn to challenge themselves occasionally (Srichan, Tachaphahapong, & Methakunavudhi, 2016). An entrepreneurial strategy confers a competitive advantage by selecting business solutions that eliminate some weaknesses and plan or correspond procedures for unique benefits and goals (Kouzes & Posner, 2012; Duggan, 2013). Many businesses have grown by leaps and bounds over the past year, as a result of entrepreneurs' abilities and their future predictions. Otherwise known as strategic intuition, this is one type of learning strategy that entrepreneurs use to learn more successfully. Hence, an effective business roadmap will help and develop the strategic intuitions of entrepreneurships in circular business advantages. For these reasons, this study develops strategic intuition indicators by using principal component analysis techniques to verify the dimensionality and structure of variables. The study includes an explanation of the statistical relationship between the smallest variables of latent variables (unobserved variables), referred to as their components. Wiratcha (1999) explained an important concept regarding the structure of principal component analysis, which some variables couldn't objectively identify and measure its physical characteristics. It is known as latent constructs/variables or unobserved variables. Nevertheless, all these details can provide accurate references. However, principal component analysis is part of a statistical–technical process to expose existing latent variables by differences between studying observed variables and analysis of variance. Hopefully, this study of strategic intuition will prove helpful to innovative entrepreneurs. In particular, the developed strategic intuition model can be identified more clearly and positive steps can be taken toward achieving the objectives of entrepreneurs in Thailand. The main objective of this research is to study and develop the strategic intuition indicators of small and medium-sized enterprises (SMEs) in Thailand and facilitate the development of strategic indicators to guide the model to promote the strategic intuition capability of entrepreneurs in the future.

2. Literature Review

2.1 Concepts and theories of developing indicators

Kanchanawassi (2002) stated the dimensional conceptualisations of the process of developing indicators that captured two concepts; 1) Developing indicators by either grouping variables or related components or by consistency with the representative status through a principle of theoretical logic. The next step is to set the priorities of variables or components that follows by developing process indicators to synthesise either variables or indicator components. 2) Developing indicators by analysing the empirical data, and then grouping either variables or related components by using a statistical method for creating indicators. Nowadays, for both these concepts most popular methods and modern trend in research methodology. Wiratcha (1999) suggests that the concept of developing indicators characteristics is similar to the process of studying variables but that each stage of a quality audit is likely to be divided between the different stages of developing indicators. Additionally, good and high-quality of developing indicators should be reliable, valid, capable, consistent, and acceptable (Gibbon, 1996). For the developing indicators' methodology that normally used factor analysis, by using empirical data. All things considered step by step; analysing and grouping variables. Through the developing indicators' concept that can defined in two methods; 1) Developing indicators by using Exploratory Factor Analysis (EFA), which develops the indicators as latent variables. This technique does not either identify the model or engage the support hypothesis. However, the developing indicator technique also has a weak point, in that its analysis of results is ineffective. For this reason, the technique identifies all variables in the model as the result of all components, and the variable error is irrelevant. 2) Developing indicators by using Confirmatory Factor Analysis (CFA), which develops the component analysis by estimating accuracy hypothesis model with theory engagement. This

technique can decrease the negativity and weak point of exploratory factor analysis (Pinyo, 2018). A survey of many international studies provides an overview of a developing indicators' topic, which is developing the indicators from the database and checking the accuracy of the hypothesis model. The developing indicators were created by methodology and empirical analysis that uses the Structural Equation Model (SEM). Meanwhiles, a theory is formalised model that is both consistent and correspondent with empirical data. Also included is the structural equation model, which is an effective tool for estimating the parameters of the developing indicators (Tan, 1992; Ashworth & Harvey, 1994; Joseph & Joseph, 1997).

2.2 Concepts and theories of the strategic intuition

Intuition is a mental process that involves instinctive feeling rather than conscious reasoning and quick decision-making stemming from knowledge-based experience (Miller & Ireland, 2005). From the scientific perspective, the human recognition process consists of five senses. However, the concept of this research is intuition, represented by a sense of foresight arising from one's own instinct. Khatri and Ng (2000) explain intuition as being part of some entirely subconscious level. This level of thinking differs from systematic thinking. This is consistent with Dane and Pratt (2007), who state that the past experiences of leaders are as important as are effectiveness and efficiency in a leadership role. A leaders' relevant experience and background can enable them to identify the critical factors of phenomena. Phaskyud (2012) explains that the capacity of foresight is the part of the vision of a leader, focusing attention on what matters most. A useful vision must be rooted in a leader's past and has gained remarkable for his/her perfect wisdom to explain future scenarios. In addition, Dadds (2008) reports that the processes of categorising and evaluating competitors to understand their strengths and weaknesses are important for business competition in enabling business leaders to determine how their competitors will respond to their next move and process-perspective. Koksat (2007) defines the concept of intuition as the transference of feeling to the surrounding environment and understanding of the basics of new beginnings. Schmidt (1996) identifies intuition as the key point of communication systematic-process and environment. Aujirapongpan and Jutidharabongse (2017), studied the following strategic intuition development concept from Duggan (2013). They found that the intuition development process consists of 4 steps: 1) Learning the successions and examples from history. Entrepreneurs should have former business experience, irrespective of whether it is of success or of failure. These direct or indirect reasonings can be transferred to the next step of business thinking. 2) Creating presence of mind, which is thinking outside the box, associated with concentration and from a new perspective. 3) Reflecting the innate idea and flash of insight. This involves integrating two previous steps to arrive at intuition through concentration. 4) Operating as the resolution. Operating at peak efficiency and being ambitious can drive realistic strategies. Jutidharabongse, Aujirapongpan, and Ritkaew (2020) describe the development of dynamic knowledge management capability and strategic intuition. They find that development of genuine wisdom by systematic knowledge management through conscious mental concentration can lead to the next stage of strategic intuition. The successful development of the skill of intuition is based on the condition of mind whereby past and present states are blended. Thinking creatively and freely allow one to have many and greater perspectives on events (Duggan, 2013). In considering the components in strategic intuition, Aujirapongpan and Jutidharabongse (2017) explain this concept from an eastern perspective related with Buddhist practices (three studies). Three studies consist of morality, concentration, and wisdom. One's mental state and knowledge state are both important for problem-solving. The strategic intuition indicators are represented and summarised in Table 1.

Table 1. The strategic intuition indicators

Indicators	Researchers
1. Intention and bringing of the learning experiences from the past situations in making decision, automatically.	Aujirapongpan & Hareebin (2020), Jasińska (2019), Ramhit (2019).
2. Capability of the changing signal for the market environments.	Bunge (1983), Radin (1997).
3. Integration of thoughts in order to better perceive customers' needs.	Allinson, Chell & Hayes (2000).
4. Feasibility analysis of future custormers' needs.	Bradley (2007).
5. Composite indicators and the tendency of future customers' needs.	McCraty, Atkinson & Bradley (2004).
6. Comparative thinking methodology of past situations in order to identify causes of problems.	Aujirapongpan, Ru-zhe & Jutidharabongse (2020), Patel, S. & Mehta, K. (2017).
7. Basics of multi-perspective analysis for problem solving in an organisation.	Aujirapongpan & Hareebin (2020).
8. Practical techniques of proactive mindset application for identifying current customers' needs.	Liu, Shiue, Chen & Huang (2019), Agor (1984), Burke & Miller (1999).
9. Data collection techniques for strategic planning-decision.	Myers (2002).
10. Evaluation of meticulously thinking outcomes, before making them part of the strategic planning.	Mitchell, Friga & Mitchell (2005), Aujirapongpan, Ru-zhe & Jutidharabongse (2020).
11. Identification and analysis of causes of organisation problems.	Gong & Blijleven (2017).
12. Optional identification for organisation's strategic objectives that outline expected results.	Aujirapongpan & Hareebin (2020), Myers (2002), Riqueleme & Watson (2002).
13. Analysis of the options leading to the organisation's solutions.	Kahneman (2003), Bradley (2006).
14. Comparison of the options which are most possible and appropriate for strategic decision.	Voronkova, Nikishkin, Frolova, Matveeva, Murzagalina & Kalykova (2019).
15. Evaluation of individual options regarding their extent of significance and insignificance.	Sedighi, Lukosch, Van , Brazier, Hamedi & Van (2017), Wang, Geng & Gao (2018).

Source: Compiled by the authors

3. Methodology

This study explores the developed strategic intuition indicators of SME entrepreneurs in Thailand through qualitative research by exploratory factor analysis and confirmatory factor analysis. The study uses empirical data and questionnaires and verifies the correspondence model extract information on the associate with SMEs entrepreneurs in Thailand.

3.1 Sample and unit analysis

This research collected and analysed a sample of entrepreneurs in SMEs, in addition to all entrepreneurs that also engage in international knowledge and business and are involved in long-term strategic planning and control for their organisations. The presented assessments are based on reference data from 2,784 companies from the Thailand Exporter Directory, Ministry of Commerce (Updated 31st December 2017). The research sample was collected from 360 SMEs, based on research methodology and Structural Equation Modelling. Optimising balance that the sum of weights across equals the total matched sample size by 20 times of variables in Structural Equation Modelling (SEM) (Wiratchai, 1999). The unit of analysis of the current study is Proportional Stratified Random Sampling for each group of SMEs.

3.2 Research tools and techniques

This study used questionnaire methods as research tools to collect data for examining the relationships between variables. This methodology was adapted from current studies and research theories engaged in phase 1 of qualitative research. This study is set out in two sections: the first is survey questions about the personal information of entrepreneurs. The second is the components in the strategic intuition of entrepreneurs.

3.3 Data collection, analysis, and measurement

To achieve the study's research objectives, the researcher wrote and used a petition letter and questionnaires. Collecting and analysing the survey data for all executives via post mails. 1 month later, which of the following their results. Meanwhile, phone calls were made to identify the correct respondents from the firms. Many questionnaire answers were readily perceived, and some were intensely reacted to rejection. Based on the comprehensive results of the existing questionnaire answers, the researcher checked again to see whether some of the results suited the context of the research methodology. The researcher measured the consistency test of Linear Structural Relationship that is used in the SEM-Analysis technique. Meanwhile, the researcher used the LISREL program to develop empirical benchmarks of comparison that reflected the questionnaires. This included analysing the mean and standard deviations in the statistical data set. The Kaiser–Meyer–Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity were used to compare the observed correlation matrix and check for redundancy between the variables that can be summarised with a few numbers of factors by using the Partial Correlation and Identification of the Model. To study on the model configuration parameters, determine how the model runs by specifying the condition analysis. Includes, the Factor Analysis by using EFA and CFA to verify all factors and the consistency of theories. Representing a rational and logical set of relationships exist among all components.

4. Empirical Results and Discussion

4.1 Results

The researcher examined and studied the context of the validity of the measure used in data collection using 342 questionnaires (Aujirapongpan & Hareebin, 2020). The average survey response rate was 31.06% as respondent's submission. However, the survey response rate was confirmed as being enough to create the SEM by the sample size-information answers (See Table 2).

Table 2. Frequency and percentage of the sample size-information answers (n=342)

Information	Status	Frequency	Percentage
Gender	Male	303	88.60
	Female	39	11.40
Age	31 – 40 years old	55	16.08
	41 – 50 years old	129	37.72
	More than 50 years old	158	46.20
Education	Bachelor's degree	35	10.23
	Master's degree	295	86.26
	Doctoral degree	12	3.51
Work experiences	Less than 10 years	15	4.39
	10 – 15 years	42	12.28
	16 – 20 years	135	39.47
	More than 20 years	150	43.86
Position	Vice president / Executive Chief	39	11.40
	Managing director / Assistant managing director	252	73.68
	Chief officer / Manager	51	14.91
Length of business operation	Less than 10 years	50	14.62
	10 – 15 years	187	54.68
	16 – 20 years	97	28.36
	More than 20 years	8	2.34
Total number of staff employed	1 – 50 people	5	1.46
	51 -100 people	70	20.47
	101 – 200 people	267	78.07

The analysis in Table 2 is based on data collected from 342 questionnaires. The results shown in Table 2 indicate that 303 people (86.60%) males are more likely to be vulnerable, compared to only 39 females (11.40%). The table also reveals that, on average, approximately 158 (46%) are more than 50 years old, approximately 129 (37.75%) are less than 50 years old, and approximately 55 (16.08%) are 31–40 years old. A total of 281 (86.26%) of the entrepreneurs have a Master's degree, 35 (10.23%) have a Bachelor's degree, and 12 (3.51%) have a Doctoral degree. A total of 150 (43.86%) of the entrepreneurs have more than 20 years' work experience, 135 (39.47%) have 16–20 years' work experience, 42 (12.28%) have 10–15 years' work experience, and 15 (4.39%) have less than 10 years' work experience. A total of 252 (73.68%) of the sample hold positions as managing directors and assistant managing directors, 51 (14.91%) hold positions as chief officers and managers, and 36 (11.40%) hold positions as vice presidents and chief executives. The table also show that 187 (54.68%) of the business have been in operation for 10–15 years, approximately 97 (28.36%) have been in operation for less than 10 years, approximately 50 (14.62%) have been in operation for 16–20 years, and approximately eight (2.34%) have been in operation for more than 20 years. A total of 267 SMEs (78.07%) have approximately 101–200 staff, 70 (20.47%) have approximately 51–100 staff, and five (1.46%) have approximately 1–50 staff.

In the next step of the study, the researcher analysed the components of EFA in the variables of 15 strategic intuition indicators. Studies has proven that didn't find the indicators less than 0.3. This means that the number of indicators and amount of questions are similar. Testing of the correlation matrix by Bartlett's Test of Sphericity yielded an approximate Chi-Square of 1,740.28, with 105 degrees of freedom, and a P value = 0.000. Significance level was 0.01, and the Kaiser-Meyer-Olkin statistic was 0.587, which means the correlation matrix of the latent variables is not the identity matrix. This study has confirmed that the relationships between variables and factors are enough to create either a component model or a strategic intuition indicators model at the international level. The components of weight indicators are shown in Table 3.

Table 3. component of weight strategic intuition indicators

Strategic intuition indicators	Component of weight		
	3	2	1
V1 Intention and learning from previous experience to guide automatic individual decision-making.	0.848	-0.101	-0.252
V2 Capacity for change and performance in the external environment of exporting business.	0.761	-0.407	-0.089
V3 Integrated customer thinking for better understanding customer needs and wants.	0.738	0.304	0.282
V4 Analysis of the feasibility of future clients' needs.	-0.614	0.304	0.208
V5 Clearly indicated details and trends of future clients' needs.	-0.547	-0.239	0.179
V6 Comparison methodology in former situations for cause finding.	-0.512	-0.070	0.059
V7 Basic of multiple perspectives' analysis for problem solving in organisations.	-0.432	-0.502	-0.005
V8 Adaptation technique of proactive thinking for finding customer needs.	0.023	0.780	-0.206
V9 Data collection technique from many places, which helps in strategic decision planning.	-0.110	-0.619	-0.317
V10 Critical thinking evaluation and using the results for strategic planning.	-0.281	0.501	-0.369
V11 Identification and analysis of the causes of an organisation's problems.	0.037	-0.398	-0.021
V12 Identification of multiple options for operational objectives of organisations.	0.055	0.024	0.615
V13 Optional analysis as the problem-solving guideline.	-0.188	-0.046	0.748
V14 Comparison between different possible options and selection of suitable options.	0.002	0.142	0.731
V15 Evaluated value consideration in significant options and disadvantage evaluation.	0.321	0.083	-0.543

Table 3 shows that the components have Eigenvalues of >1 and cumulative variance of approximately 48.735%. This means that all latent variables can explain the variance of three components (48.735). All components shown contribute significantly to the study (Shown in Table 4).

Table 4. Components of Eigenvalues, percentage of variance, and percentage of cumulative variance in strategic intuition components

Components	Initial Eigenvalues			Extraction Sums of Squared Loading		
	Total	Percentage of variance	Percentage of cumulative variance	Total	Percentage of variance	Percentage of cumulative variance
1	3.440	22.930	22.930	3.440	22.930	22.930
2	2.147	14.310	37.241	2.147	14.310	37.241
3	1.242	11.495	48.735	1.242	11.495	48.735

Table 4 confirms that the results can identify the strategic intuition indicators. All of them can be related with these concepts and theories;

1. Indicator V1–V6 defines respective components of ability to recognise opportunities (Sensing capabilities), or SI1, represented as either intuition capability or seeing opportunity. That leads to evaluated consideration for the imagination situation.

2. Indicator V7–V11 defines respective components of ability for proactive thinking (Aggressive thinking capabilities), or SI2, represented as thinking, previous experience, and the existing situation. The concept focuses on future situations that can respond to external factors.

3. Indicator V12–V15 defines respective components of ability to make decisions proactively (Strategic decision capabilities), or SI3, represented as conditions for making decisions in an organisational vision. Emphasis is placed on future situations related to the effectiveness of business competition.

The reliability of each component was assessed by using Cronbach's Alpha Coefficient (Cronbach, 1990). Each component must have acceptable reliability of Alpha Coefficient for each scale of no less than 0.70. This is an acceptable reliability result (Shown in Table 5).

Table 5. Alpha Coefficient of strategic intuition components

Variables	Components	Alpha Coefficient
Strategic intuition (SI)	Ability to recognise opportunities (SI1)	0.953
	Ability for proactive thinking (SI2)	0.825
	Ability to make decisions proactively (SI3)	0.911

This study applied normal distribution tests using the results of basic statistical analysis, skewness, and kurtosis. The results show a normal distribution of data, meaning that most of the elements in the data set are close to the level of acceptance and are no more than 2.58 (Hair, Black, Babin, & Anderson, 2014). See Table 6.

Table 6. Basic statistical analysis results of strategic intuition components

Components	$\overline{X}$	Comprehension	S.D.	SKEW	KURT
Ability to recognise opportunities (SI1)	3.821	High Level	0.319	0.325	-0.906
Ability for proactive thinking (SI2)	3.831	High Level	0.262	0.185	-0.301
Ability to make decisions proactively (SI3)	3.853	High Level	0.213	-0.075	0.280
Total	3.835	High Level	0.139	0.153	0.011

From Table 6, the variables of strategic intuition (SI) shows that the average level the of variables is high ($\overline{x}$ = 3.835). Meanwhile, the averages of the components of ability to recognise opportunity (SI1), ability for proactive thinking (SI2), and ability to make decisions proactively (SI3) are between 3.821–3.853. The standard deviation is between 0.213–0.319. Following the normal distribution tests of the variables of strategic intuition (SI), which measure by components or three variables; ability to recognise opportunity (SI1), ability for proactive thinking (SI2) and ability to make decisions proactively (SI3). See Table 7.

Table 7. The normal distribution tests

Variables	Skewness	Kurtosis	Normal Distribution
SI	0.153	0.011	√
SI1	0.325	-0.906	√
SI2	0.185	-0.301	√
SI3	-0.075	-0.280	√

The analysis in Table 7 is based on the normal distribution tests. The results indicate that all components or latent variables in three strategic intuitions have skewness of between -0.075–0.325 and kurtosis of between -0.906–0.010. In all these results, skewness is no more than 0.75 (absolute value) and kurtosis is no more than 1.5 (absolute value) based on the normal distribution concept, which results are suitable for CFA (Wiratchai, 1999).

The findings also indicate Construct Validity; this was tested through questions about the latent variables, using the average of the composite score. More than one question was used for the item parcelling to reduce the number of indicators in the structural equation and to increase the consistency of opportunities. This is an acceptance concept for the Structural Equation Analysis Technique. The results of the validity tests of strategic intuition used by the Measurement Model include the CFA using Lisral version 8.72. As the first results did not match the empirical data, the model was further developed and re-tested in question welders by testing and adjusting the Modification Indices (MI). After adjustment of the model, the results indicated that the model matched the empirical data (See Fig.1).

Chi-square =474.64, df = 137, $\chi^2/df = 2.87$
NFI =0.95, IFI =0.96, CFI =0.97, GFI = 0.98, AGFI =0.96, RMR = 0.03, RMSEA = 0.03
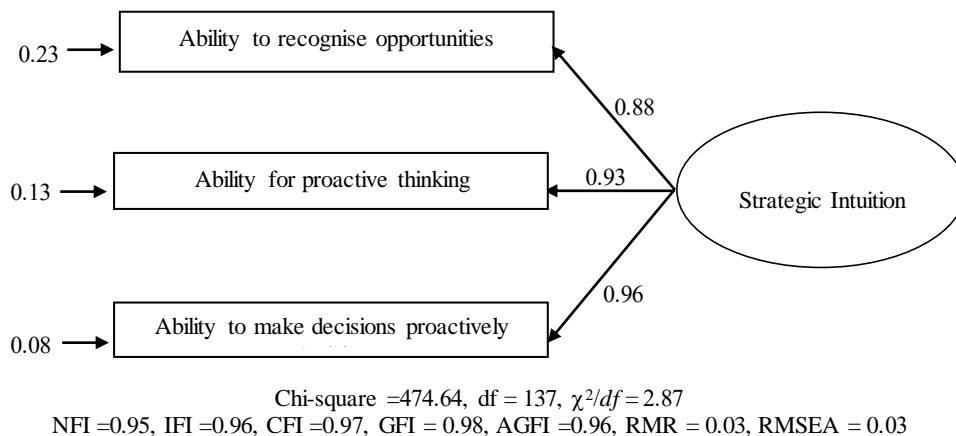
Fig. 1 The results of components validity analysis on strategic intuition measurement model (Developed model)

Fig.1, CFA of the strategic intuition measurement model after being further developed and re-tested. The overall results of measurements of the model's fit show that the proportion of Chi-square and degrees of freedom (χ^2/df) are 2.87, which is less than the acceptance criterion of three. More than or equal in 0.90 is the specify indexing. The acceptance criteria for indexes are GFI = 0.98, AGFI = 0.96, NFI = 0.95, IFI = 0.96, and CFI = 0.97. Meanwhiles, if it's less than 0.08 indexing. The acceptance criteria for indexes are RMR = 0.03 and RMSEA = 0.03. This means that the developed strategic intuition model matches the empirical data. In addition, the validity testing on the strategic intuition measurement model was measured by using the Component Fit Measure. The Measurement Model shows the variables of strategic intuition (SI), which consist of Factor Loading (Three components are positive). The component of "ability to recognise opportunities (Factor Loading = 0.88)" fluctuates in quantities deriving from the strategic intuition (77.0%), the component of "ability for proactive thinking (Factor Loading = 0.93) " fluctuates in quantities deriving from the strategic intuition (87.0%), and the component of "ability to make decisions proactively (Factor Loading = 0.96)" fluctuates in quantities deriving from the strategic intuition (92.0%). In addition, each components of strategic intuition model are the Convergent

Validity, because of Construct Reliability: ρc is equal in 0.95. It means, that passed the criteria (> 0.60) and the fluctuation of Construct Reliability: ρv is equal in 0.85 that also passed the criteria (> 0.50) (Hair et al. 2014). See Table 8.

Table 8. The results of convergent validity in the strategic intuition model

Variables	Latent variables	Factor Loading			t	R^2
		B	S.E.	B		
SI	SI1	1.00	-	0.88	-	0.77
	SI2	1.07	0.04	0.93	26.50*	0.87
	SI3	1.15	0.05	0.96	24.01*	0.92
		ρc= 0.95, ρv = 0.85				

*P<0.05

4.2 Discussion

The researcher had developed and studied the indicators, which the concept of developed indicators by Empirical Definition. SEM identified three components of strategic intuition: (1) Sensing capabilities (ability to recognise opportunities), (2) Aggressive capabilities (ability for proactive thinking), and (3) Strategic decision capabilities (ability to make decisions proactively). In addition, SMEs in Thailand have a high level of strategic intuition and a wide variety of capabilities. Strategic decision capabilities are highest, followed by aggressive capabilities and sensing capabilities, respectively. These results match those of Aujirapongpan and Hareebin (2020), Myers (2002), Riqueleme and Watson (2002), Kahneman (2003), and Bradley (2007). The study shows that SMEs in Thailand have the ability to conduct environmental value assessment through experiences and self-management to identify existing problems. This includes Option analysis for problem solving by comparing all possible options. This is based on value consideration and strategic business value creation.

5. Conclusions

The analysis of EFA on strategic intuition variables by 15 indicators that affects to this research. Taking all these things into consideration helps in identifying the sub-components to be the guideline for developed strategic intuition capability through the Manifest Variables. The Manifest Variables consist of three components; (1) ability to recognise opportunities. This is intuitive capability, or seeing opportunities for learning in consideration and evaluation. This concept can create for each imagination situation. (2) ability for proactive thinking. This is thinking capability, which is based on data, previous experiences, and the existing situation. The concept focus on the future situation that can respond to external factors. (3) ability to make decisions proactively. This is the condition for making decisions in an organisational vision. Emphasis is placed on future situations related to the effectiveness of business competition. However, further research is needed to address other variables. Both individual factors and organisational factors, which affect the competitiveness of SMEs, should be added. This is an important, as these affect firms' performance, including how to study the indicators in each component and to build an effective measurement model. The strategic intuition capability of entrepreneurs is directly related to the strategic selection. Furthermore, the strategic selection of operative planning should be matched with organisational vision and missions. Hence, all entrepreneurs need to gain extensive knowledge and experiences to create and develop their strategic intuition capability. This research provides valuable input to further business start-ups and solutions.

References

Agor, W. H. (1984). Using intuition to manage organisations in the future. *Business Horizons*, 27(5), 49-54. https://doi.org/10.1016/0007-6813(84)90057-0

Allinson, W. C., Chell, E. & Hayes, J. (2000). Intuition and Entrepreneurial Behaviour. *European Journal of work and Organizational Psychology*, 9(1), 31-43. https://doi.org/10.1080/135943200398049

Ashworth, A. & Harvey, R. (1994). *Assessing Quality in Future and Higher Education*. London: Jessica Kingsley.

Aujirapongpan, S. & Jutidharabongse, J. (2017). Strategic intuition: The development of leader in the 21st century. *WMS Journal of Management,* 6(3), 125-133. https://so06.tci-thaijo.org/index.php/wms/article/view/99800

Aujirapongpan, S. & Jutidharabongse, J. (2017). The role of knowledge management in developing strategic intuition. *Suratthani Rajabhat Journal*, 4(2), 21-44. https://so05.tci-thaijo.org/index.php/srj/article/view/212539

Aujirapongpan, S. & Hareebin, Y. (2020). The effect of strategic intuition, business analytic, networking capabilities and dynamic strategy on innovation performance: The empirical study Thai processed food exporters. *Journal of Asian Finance, Economics and Business*, 7(1), 259-268. https://doi.org/10.13106/jafeb.2020.vol7.no1.259

Aujirapongpan, S., Ru-zhe, J. & Jutidharabongse, J. (2020). Strategic intuition capability toward performance of entrepreneurs: Evidence from Thailand. *Journal of Asian Finance, Economics and Business, 7*(6), 465 – 473. https://doi.org/10.9770/jesi.2020.7.4(25)

Bradley, R. T. (2007). The pscyhophysiology of intuition: A quantum holographic theory of nonlocal communication. *The Journal of New Paradigm Research*, 63(2), 61-97. https://doi.org/10.1080/02604020601123148

Bunge, M. A. (1983). *Treatise on Basic Philosophy*. Dordrecht: D. Reidel Publishing Company.

Burke, L. A. & Miller, K. M. (1999). Taking the mystery out of intuitive decision making. *Academy of Management Executive*, 13(4), 91-98. https://www.jstor.org/stable/4165589

Cronbach, L. J. (1990). *Essentials of psychological testing*. (5th ed.). New York: Harper Collins Publishers.

Dadds, M. (2008). Empathetic validity in practitioner research. *Educational Action Research,* 16 (2), 279-290. https://doi.org/10.1080/09650790802011973

Dane, E. & Pratt, M. G. (2007). Exploring Intuition and Its role in managerial decision making. *The Academy of Management Review, 32*(1), 33-54. http://homepages.se.edu/cvonbergen/files/2012/12/EXPLORING-INTUITION-AND-ITS-ROLE-IN-MANAGERIAL-DECISION-MAKING1.pdf

Duggan, W. (2013). *Strategic intuition: The creative spark in human achievement.* (2nd ed). New York: Columbia Business School Press.

Gibbon, F. (1996). *Monitoring education on quality indicators of lifelong learning.* London: Cassell.

Gong, Y. & Blijleven, V. (2017). The role of lean principles in supporting knowledge management in IT outsourcing relationships. *Knowledge Management Research & Practice*. 15(4), 533-541. https://doi.org/10.1057/s41275-017-0072-8

Hair, J. F., Black, W. C., Babin, B. J. & Anderson, R. E. (2014). *Multivariate data analysis.* (7th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Jasińska, M. (2019). Recognition and description of synergy conditions in teamwork in view of the grounded theory. *Entrepreneurship and Sustainability Issues. 7*(1), 375-397. https://doi.org/10.9770/jesi.2019.7.1(27)

Jutidharabongse, J., Aujirapongpan, S., Ritkaew, S. 2020. Dynamic knowledge management capability and strategic intuition of Thai entrepreneurs. *Entrepreneurship and Sustainability Issues*, 7(4), 2955-2966. http://doi.org/10.9770/jesi.2020.7.4(25)

Joseph, M. & Joseph, B. (1997). Service quality in education: a student perspective. *Quality Assurance in Education, 5*(1), 15-21. https://doi.org/10.1108/09684889710156549

Kahneman, D. (2003). A perspective on judgment and choice. *American Psychologist, 58*(9), 697-720. https://psycnet.apa.org/doi/10.1037/0003-066X.58.9.697

Kanchanawassi, S. (2002). *Applied statistics for behavioral research.* (3rd ed.). Bangkok: Chulalongkorn University Press.

Khatri, N. & Ng, H. A. (2000). The role of intuition in strategic decision making. *Human Relations,* 53, 57– 86. https://doi.org/10.1177%2F0018726700531004

Koksal, M. H. (2007). Consumer behaviour and preferences regarding children's clothing in Turkey. *Journal of Fashion Marketing and Management,* 11(1), 69-81. https://doi.org/10.1108/13612020710734418

Kouzes, J. M. & Posner, B. Z. (2012). *The leadership challenge: How to make extraordinary things happen in organizations.* San Francisco: Jossey-Bass.

Liu, J. Y., Shiue, W., Chen, F. H. & Huang, A. T. (2019). A multiple attribute decision making approach in evaluating employee care strategies of corporate social responsibility. *Management Decision, 57*(2), 349-371. https://www.emerald.com/insight/content/doi/10.1108/MD-03-2018-0230/full/html

McCraty, R., Atkinson, M. & Bradley R. T. (2004). Electrophysiological evidence of intuition: Part 1. The surprising role of the heart. *Journal of Alternative and Complementary Medicine,* 10(1), 133-143. https://doi.org/10.1089/107555304322849057

Miller, C. C. & Ireland, R. D. (2005). Intuition in strategic decision-making, Friend or foe in the fast-paced 21st century. *Academy of Management Executive,* 19(1), 19-30. https://doi.org/10.5465/ame.2005.15841948

Mitchell, J. R., Friga, P. N. & Mitchell, R. K. (2005). Untangling the intuition mess: Intuition as a construct in entrepreneurship research. *Entrepreneurship Theory and Practice,* 20(4), 653-679. https://doi.org/10.1111%2Fj.1540-6520.2005.00102.x

Myers, D. (2002). *Intuition: Its powers and perils.* New Haven: Yale University Press.

Patel, S. & Mehta, K. (2017). Systems, Design, and Entrepreneurial Thinking: Comparative Frameworks. *Syst Pract Action Res*, *30***,** 515– 533(2017). https://doi.org/10.1007/s11213-016-9404-5

Phasukyud, P. (2012). *Intuition.* (7th ed.). Bangkok: FreeMind.

Pinyo, T. (2018). Techniques for interpreting the results of factor analysis in research work. *Panyapiwat Journal. 10*(Special Issue), 292-304. https://journal.pim.ac.th/uploads/content/2018/07/o_1cjnk0uj0186n1o6s1o0sn2o16rta.pdf

Radin, D. I. (1997). Unconscious perception of future emotions: An experiment in presentiment. *Journal of Scientific Exploration,* 11(2), 163-180. https://www.scientificexploration.org/docs/11/jse_11_2_radin.pdf

Ramhit, K. S. (2019). The impact of job description and career prospect on job satisfaction: A quantitative study in Mauritius. *SA Journal of Human Resource Management,* 17(a1092). https://doi.org/10.4102/sajhrm.v17i0.1092

Riqueleme, H. & Watson, J. (2002). Do venture capitalists' implicit theories on new business success/failure have empirical validity. *International Small Business Journal,* 20, 395-418. https://doi.org/10.1177%2F0266242602204002

Robbins, L. G. (2003). Maternal-zygotic lethal interactions in drosophila melanogaster: Zeste-white region single-cistron mutations. *Genetics,* 103*,* 633-648. https://pubmed.ncbi.nlm.nih.gov/17246119/

Schmidt, A. M. (1996). Cross-language identification of consonants, part 1. Korean perception of English. *The Journal of the Acoustical Society of America,* 99*(*5), 3201–3211. https://doi.org/10.1121/1.414804

Sedighi, M., Lukosch, S., Van S. S., Brazier, F. M. T., Hamedi, M. & Van B. C. (2017). Employees' participation in electronic networks of practice within a corporate group: Perceived benefits and costs. *Knowledge Management Research and Practice,* 15(3), 460-470. https://doi.org/10.1057/s41275-017-0059-5

Simon, H. A. (1997). *An Empirically Based Microeconomics.* Cambridge, UK: Cambridge University Press.

Srichan, T., Tachaphahapong, S. S. & Methakunavudhi, P. (2016). A factor analysis of leadership in the twenty first century of student organization board. *Journal of Research Methodology*. 29(2), 139-156. http://cuir.car.chula.ac.th/handle/123456789/50933

Tan, D. L. (1992). A Multivariate Approach to the Assessment of Quality. *Research in Higher Education,* 33(2), 205-226. https://doi.org/10.1007/BF00973579

Voronkova, O. Y., Nikishkin, V., Frolova, I. I., Matveeva, E., Murzagalina, G. & Kalykova, E. (2019). Importance of the process of teaching the basics of social entrepreneurship for the sustainable development of society. *Entrepreneurship and Sustainability Issues 7*(2), 1048-1058. https://doi.org/10.9770/jesi.2019.7.2(18)

Wang, Y., Geng, S. & Gao, H. (2018). A proactive decision support method based on deep reinforcement learning and state partition. *Knowledge-Based Systems,* 143, 248-258. https://doi.org/10.1016/j.knosys.2017.11.005

Wiratchai, N. (1999). *LISREL: Statistical analysis for research* (3rd ed.). Bangkok: Chulalongkorn University Press.

Somnuk AUJIRAPONGPAN, Ph.D., is an associate professor in accounting and director of Graduate Study in Innovation Management and Business Development Program, School of Management, Walailak University, Thailand. He received his Ph.D. in technopreneurship and innovation management from Chulalongkorn University. His professional expertises are managerial accounting, cost accounting, knowledge management, innovation management and entrepreneurship development. His publications have appeared in various national and international academic journals about managerial accounting, entrepreneurship and business development. He also is a corresponding author of this article who provides the intellectual input, designs and approves the protocols to be followed in the study.
ORCID ID: https://orcid.org/0000-0001-6275-9053

Yaninee SONGKAJORN, Ph.D., is a lecturer in Graduate Study in Innovation Management and Business Development Program, School of Management, Walailak University, Thailand. She received her Ph.D. in technopreneurship and innovation management from Chulalongkorn University. Her publications have appeared in various national and international academic journals about innovation management and entrepreneurship development.
ORCID ID: https://orcid.org/0000-0002-0474-4619

Yuttachai HAREEBIN, Ph.D., is a lecturer in Faculty of Management Science, Phuket Rajabhat University, Thailand. He received his Ph.D. in business administration from Walailak University. His publications have appeared in various national and international academic journals about human resource management and business administration.
ORCID ID: https://orcid.org/0000-0002-4578-0720

Sirichai DEELERS, Ph.D., is an assistant professor in management of Faculty of Management Science, Silpakorn University, Thailand. He received his Ph.D. in management from Silpakorn University. His publications have appeared in various national and international academic journals about innovation management, business administration and information management.
ORCID ID: https://orcid.org/0000-0002-6521-1795

Jaturon JUTIDHARABONGSE, Ph.D. in business administration from Walailak University**,** is a research assistant of Graduate Study in Innovation Management and Business Development Program, School of Management, Walailak University, Thailand. His publications have appeared in various national and international academic journals about knowledge management and human resource development.

ORCID ID: https://org/0000-0002-1571-778X

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Publisher
http://jssidoi.org/esc/home

SUSTAINABLE MANAGEMENT OF FRESHWATER SWAMP FOREST AS AN ECOTOURISM DESTINATION IN INDONESIA: A SYSTEM DYNAMICS MODELING[*]

Sjaifuddin Sjaifuddin

Department of Science Education, Universitas Sultan Ageng Tirtayasa
Jl. Ciwaru Raya No.25, Cipare, Kec. Serang, Kota Serang, Banten 42117, Indonesia

E-mail: sjaifuddin@untirta.ac.id (corresponding author)

Abstract. As a freshwater swamp forest that still remains in Java, the existence of Rawa Danau as an ecotourism destination is important to be explored, because its utilization is not yet based on sustainable management principles. For this reason, a system dynamics modeling was then made that integrates various factors in the biophysical, social, and economic dimensions to obtain the best alternative for managing the future ecotourism destinations. Management alternatives are designed in three scenarios: deep ecotourism oriented to very strong/strong sustainability; shallow ecotourism oriented to weak sustainability; and mass tourism oriented to very weak sustainability. The results showed that deep ecotourism was the most suitable scenario to be implemented. Through this scenario, the control of several parameters that were successfully carried out during the 10 years of the simulation are as follows: 1) restrain the growth rate of tourist numbers so as not to burden the environment; 2) reforesting almost all forest land converted so that the restoration of forest functions goes well; 3) increase local community income so that the community gets adequate economic benefits; 4) increase environmental investment so that stakeholders benefit economically, ecologically, and socially in an integrated manner; 5) maintaining biodiversity at a high level; 6) maintain swamp water reserves at a very good level; 7) reduce the volume of solid waste so that it does not burden the environment.

Keywords: sustainable management; freshwater swamp forest; ecotourism destination; system dynamics modeling; Rawa Danau

---

1. Introduction

In the last few decades, tourism has developed into one of the fastest growing industry sectors in the world. Globally, in 2020, it is estimated that the number of tourists will grow 3% to 4% (UNWTO, 2020). The rapid growth of the tourism sector has an impact on increasing the income of countries in the world. Travel & tourism accounted for 10.4% (USD 8.8 trillion) of the gross domestic product (GDP) and created 319 million jobs (10% of total employment in 2018) (WTTC, 2020). It cannot be denied anymore that tourism is the most important part of a country's economy. For developed countries, in addition to making a major contribution to the sustainability of economic growth, tourism based on industry excellence also provides minimal environmental impact (Sjaifuddin, 2018). For developing countries, especially if the industrial development is not good, usually the tourism sector still has a large contribution to the state revenue (Akis, 2011). For example, in Bali, Indonesia, tourism is even able to contribute around 60-70% to the local economy, creating broad employment opportunities, and attracting investment both locally and internationally (Chong, 2020). Thus, in general, tourism is considered to have an important role in improving the quality of life (Garau-Vadell et al., 2018).

In addition to providing a positive influence economically, tourism often also presents new problems in other sectors. The main problem that often arises is the negative impact of tourism on various environmental components: biotic, abiotic, social, economic, and cultural (Cianga, 2017; Alipour & Arefipour, 2020). The negative impact is usually closely related to mass tourism. Conventionally, mass tourism is usually associated with unsustainable use of natural resources and intensive land use (Gabarda-Mallorquí et al., 2017). One of the negative impacts of mass tourism is the increasing volume of urban solid waste (Diaz-Farina et al., 2020). For example, more than 75% of waste production in the City of Paralimni (Cyprus) is generated by tourism activities (Zorpas et al., 2015). Another negative impact is the escalation of CO_2 emissions from transportation activities (Cavallaro et al., 2017). Mass tourism contributes 4.4% to global CO_2 emissions and increases an average of 3.2% per year (He et al., 2018). Improved road networks (i.e., trains, highways, airports) to support mass tourism usually have an impact on deforestation; in addition it also encourages the creation of market integration, other factors that have an impact on deforestation (Brandt & Buckley, 2018). In the coastal zone, mass tourism threatens the existence of the beach sand dune ecosystem (Fantinato, 2019). Mass tourism also drives an increase in demand for clean water supply. This condition has a significant impact on water scarcity (Chong, 2020). In various historical objects, mass tourism has a negative impact in the form of mechanical damage and conflicts of use (Drdácký & Drdácký, 2010).

By considering various impacts of mass tourism, the development of a more environmentally friendly tourism concept has now become an alternative. That is why people give great expectations to ecotourism, because mass tourism always presents a conflict of interest between economic development and ecological conservation (Hsu, 2019). Ecotourism as an alternative tourism concept becomes very interesting because it is considered to provide great benefits economically, socially, and environmentally (Wondirad et al., 2020). According to the International Ecotourism Society (TIES, 2015), ecotourism is defined as "responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education". The concept leads to the fulfillment of 5 ecotourism principles: environmental conservation, community participation, cultural preservation, local community empowerment, and economic benefits (Cobbinah, 2015). As a component of the green economy, ecotourism is a strategy to achieve a balance between economic and ecological interests (Anup et al., 2015), while community participation is considered as the best alternative compared to the social and environmental impacts caused by mass tourism (Southgate, 2006). The impact of ecotourism on local communities is usually identified through the economic, psychological, social, and political empowerment framework (Scheyvens & Scheyvens, 2015).

Ecotourism is a complex and dynamic system that involves various variables: biophysical, social, and economic. In the system, these variables interact with and depend on each other, but it also interacts complexly with other variables outside the system (Aliani et al., 2018). Complex systems also have complex problems, and only using the right methodology can be solved (Jere Jakulin, 2017). System dynamics is a methodology used to analyze complex systems through the development of representative models that reflect actual conditions (Sjaifuddin et al., 2019).

Rawa Danau is a tropical lowland swamp forest located in Serang Regency, 101 km from Jakarta, Indonesia. Rawa Danau is an ancient Volcano caldera of around 2.500 hectares, located at an elevation of 100 m above sea level (van Der Kaars et al., 2001). Ecologically, Rawa Danau is very important because it is the only tropical lowland swamp left in Java. Economically, the important role of Rawa Danau lies in its large potential as a supplier of raw water for industrial and urban areas in Serang Regency and Cilegon City (Priyanto & Titiresmi, 2006). As an ecotourism destination, Rawa Danau has a high attraction because it has beautiful panoramas and is a habitat for various species of flora and fauna. Rawa Danau is also often used as an object of study relating to the theme of ecology, geology, biology, and the environment by researchers from various universities/research institutions both locally and internationally. Nevertheless, the existence of Rawa Danau is also faced with various challenges, including the shrinking of forest area due to land conversion; decreased water storage capacity due to sedimentation processes as well as the lack of successful conservation efforts that have an impact on the overall decline in environmental quality. Considering the various conditions above, this research is important to be carried out in order to develop a model of sustainable management of Rawa Danau. The model built will involve various biophysical, social, and economic variables and be simulated through several ecotourism zone management scenarios. For this purpose, a system dynamics approach is used to provide alternative solutions to comprehensive problem solving.

2. Literature Review

2.1. Sustainable Development of Ecotourism

According to the World Commission on Environment and Development (WCED) Report, the concept of sustainable development is identified from 3 main dimensions: social, economic, and environmental sustainability (Secundo et al., 2020). This concept is increasingly gaining worldwide attention after the United Nations adopted a global action plan for sustainable development, which contains 17 sustainable development goals (SDGs) with 169 targets (van der Waal & Thijssens, 2020). The SDGs are a series of 17 large goals that articulate the outcomes of sustainable development (Ike et al., 2019). One of the key proposals regarding the most effective mechanism for achieving this ambitious agenda in 2030 is to focus on humanitarian-development-peace nexus (Howe, 2019). The declaration of 2017 as the International Year of Sustainable Tourism for Development by UNWTO has encouraged various related sectors (including tourism) to formulate the best strategy for achieving SDGs. According to Siakwah et al. (2019), the strategy was formulated based on the close link between tourism and SDGs (Table 1). Tourism bridges the achievement of SDGs 1, SDGs 13, and SDGs 15 through pro-poor tourism, volunteer tourism, and ecotourism. Community empowerment programs that are packaged through pro-poor tourism policies are proven to be able to provide economic benefits for the poor in rural areas (Torabi et al., 2019). Volunteer tourism in Tortuguero National Park Costa Rica, Mon Repos Australia, and Ubatuba Brazil is considered to have succeeded in creating broader employment opportunities for local people (Liu & Leung, 2019). Agritourism strengthens the linkages between tourism and agriculture through the development of sustainability principles (Addinsall et al., 2017). Ecotourism is one of the mechanisms needed to strengthen adaptive capacity in order to face the challenges of the current and future climate change (Jamaliah & Powell, 2018). Today ecotourism is growing rapidly in areas with high biodiversity because of its potential to achieve economic benefits and ecological conservation (Brandt & Buckley, 2018). Tourism also bridges the achievement of SDGs 6, SDGs 7, and SDGs 12 through alternative tourism and responsible tourism. Alternative tourism is

considered as an efficient mechanism for overcoming various current crises (Papageorgiou & Lytras, 2015). Through a platform of restaurant food surplus, responsible tourism supports the consistent implementation of responsible consumption (*http://ertr.tamu.edu*, 2019). In a conservation perspective, ecotourism is considered as an incentive-based management intervention. This mechanism is always associated with the institutional intervention, spatial restrictions in the ecotourism zone, economic benefits obtained by local communities, and community-oriented monitoring systems (Brandt & Buckley, 2018).

In many developing countries, ecotourism plays an important role as a source of income for local communities and reduces dependence on forests, empowering people through participation, increased access to information, strengthening organizational capacity, minimize the environmental impact, and contribute to conservation through reforestation and habitat restoration (Ma et al., 2019; Das & Chatterjee, 2015). For example, shark watching is an ecotourism industry that is developing rapidly in Mexico, annual gross income from this activity is estimated to reach USD 12.4 million with more than 15 species of sharks successfully conserved (Cisneros-Montemayor et al., 2019). Shark ecotourism in Donsol, Philippines is able to create more than 300 jobs and offer more than 200 seasonal jobs for local fishermen so as to reduce poverty (Gallagher & Hammerschlag, 2011). Bird watching (avitourism) has become a very popular hobby in South Africa, able to provide income of up to USD 362 per month to local communities, and is considered as a cost-effective way to create jobs, carry out conservation efforts, and develop human resources (Biggsa et al., 2011). Turtle watching at Mon Repos Conservation Park, Queensland, Australia is considered very important in promoting environmental education and promoting turtle conservation efforts (Tisdell & Wilson, 2005). Wildlife ecotourism in Manaus, Brazil has now changed the habits of local communities from unsustainable activities to more sustainable community-based activities, increasing forest conservation, and reducing poverty (D'Cruze et al., 2017).

Table 1. Linking SDGs and tourism

SDGs	Possible tourism to attain SDGs
No poverty	pro-poor tourism, volunteer tourism
Zero hunger	agritourism
Good health and well-being	health tourism
Quality education	tourism in-house training courses and skills development of local communities
Gender equality	inclusive tourism
Clean water and sanitation	responsible tourism
Affordable and clean energy	alternative tourism
Decent work and economic growth	local economic development through tourism
Industry, innovation and infrastructure	tourism super-structure
Reduced inequalities	inbound and outbound tourism, inclusive tourism, pro-poor tourism
Sustainable cities and communities	urban tourism, community-based tourism, inclusive tourism
Responsible consumption and production	responsible tourism, green tourism
Climate action	ecotourism
Life below water	aquatourism
Life on land	sustainable tourism, ecotourism
Peace, justice and strong institutions	inclusive tourism, peace through tourism, justice tourism
Partnerships for the goals	justice tourism, collaborative community-based tourism

(Siakwah et al., 2019)

2.2. Threat to Freshwater Swamp Forest

Freshwater swamp forests (FSF) throughout the world are now facing a very serious threat. Various natural and anthropogenic factors are often a threat to FSF and have an impact on decreasing ecological function (Baustian et al., 2018). These natural factors are usually natural disasters, while the anthropogenic factors are overharvesting, incorrect harvesting techniques, conversion to agricultural land, and land burning (Omagor, 1999). Forest degradation is one of the trigger factors for land fires during the dry season (Dwomoh et al., 2019). The excessive

utilization of FSF will be very detrimental especially for flora and fauna that are sensitive to the fluctuations in environmental factors (Sun et al., 2016). FSF is a zone rich in biodiversity and provides a variety of ecosystem services: carbon storage, water sources, germplasm sources, and food sources (Igu & Marchant, 2017). In addition to responding to environmental changes, biodiversity is also a predictor of various ecosystem functions that are important for maintaining human well-being (Mori et al., 2017). FSF is part of the tropical rain forest and has an important contribution as climate change modulators. As a carbon storage zone, the FSF in the Niger Delta, for example, is capable of storing carbon on average 228.28 ton/hectare, a large storage capacity (Igu & Marchant, 2016). The ability to store carbon by the FSF depends on: 1) the ability of flora to absorb carbon from the atmosphere; 2) the material cycle flowing from living biota to dead biota; 3) subsequent deposition and storage processes in the earth (Harrison, 2013).

Changes in FSF biodiversity are mainly caused by 2 important factors: natural and anthropogenic drivers of change (Fig. 1). Both of these factors give effect to landscape modification in the form of hydrological changes, forest degradation, and forest regeneration. The dashed line in the figure means that the FSF is resistant to the invasion of new species, so landscape modification is a more influential factor in biodiversity changes. Landscape modification will cause population change through mechanisms: food resource changes, dispersal constraints, and behavior changes. Meanwhile population change will form mutually influencing relationships with community change and species interaction. On the other hand, overharvesting is one of the important anthropogenic factors that will directly affect population change.
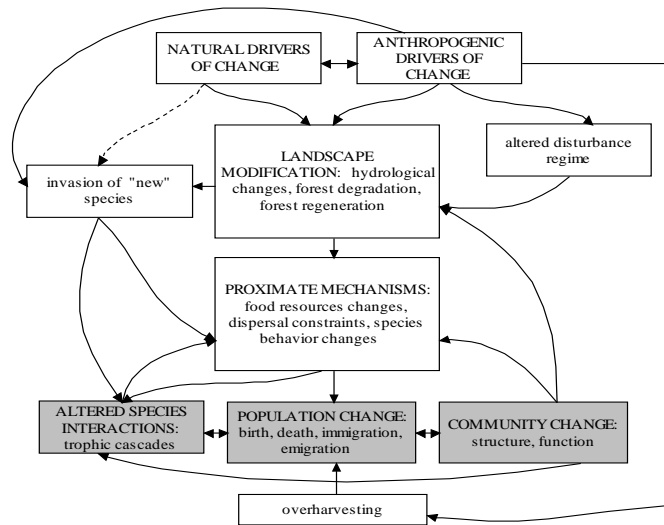
Fig. 1. Effects of natural and athropogenic drivers of change on the biodiversity of FSF (Harrison, 2013).

2.3. System Dynamics

System dynamics (SD) was first introduced in the 1950s by Forrester (Yu et al., 2019). Forrester developed a modeling and illustrated how a policy can affect the stability of industrial systems (Cesar et al., 2020). SD is a sophisticated methodology used to represent complex feedback structures (Teng et al., 2018) so it is very useful to understand cross-disciplinary issues (Tan et al., 2018). SD modeling is characterized by the existence of non-linear relationships and feedback between components in a system and is very suitable to be used to model complex socioeconomic phenomena (Wit et al., 2018). Sustainable management of ecotourism zone has characteristics that are interdisciplinary, dynamics, and non-linear so that it will be very suitable if the model uses

SD. As an aspect of system theory, SD enables the modeller to understand the nonlinearities of the system through structural modeling including circular feedback or time delayed relationships (Daneshzand et al., 2019). The use of the SD methodology is based on three main principles: 1) the development of model structure that determines the system behavior, 2) the involvement of soft variables in the model structure, 3) the understanding of mental models that produce significant leverage (Saavedra M. et al., 2018). Utilization of SD has several advantages, including: (1) visualizing the causal relationship between variables, (2) understanding the impact of delays on the system, and (3) understand the system's response to several different scenarios (Zapata et al., 2019). The researchers used SD to develop policies suitable for problem solving in various dimensions of ecotourism. To simulate a low-carbon ecotourism activity, He et al. (2018) has created a system dynamics design that involves ecotourism activities, carbon waste, and ecology using a case study in Western China. To improve coastal ecosystem management, You et al. (2018) has conducted a simulation of landscape changes using several management scenarios and case studies in Shinduri coastal zone, South Korea. Pizzitutti et al. (2017) uses SD as a decision-support system to provide recommendations to policy makers in managing the Galapagos Islands as an integrated system. Some other researchers who use SD simulations in the field of ecotourism include Lu et al. (2019) who evaluate the effect of socio-economic factors on ecological security systems of coastal tourism cities, Tan et al. (2018) modeling coastal zone management for sustainable tourism, Xu & Dai (2012) explores the policies of a world inheritance village to support sustainable tourism.

3. Method

Tourism is a goal-oriented soft system, built by integrated components e.g. tourists, demand, supply, information, as well as social, material, and financial relations between the existing subsystems (Jere Jakulin, 2017). This study uses SD as a robust methodology to explore long-term ecotourism development policies (Xu & Dai, 2012). SD provides answers to the 'what-if' question through a feedback loop that is built between variables in the system (Sukholthaman & Sharp, 2016). The SD concept is presented simply through graphs and basic formulas and does not use complicated mathematical formulas (El-Sefy et al., 2019). SD methodology is used through the steps of modeling and qualitative methods as follows (Luna-Reyes & Andersen, 2003): 1) conceptualization, consists of 2 steps: problem definition and system conceptualization. In this research, the methods used to identify problems and describe the dynamic hypotheses are interviews and content analysis; 2) model formulation. In this research, the methods used to obtain parameters and policies are interviews and content analysis; while to construct the model formulation is grounded theory; 3) testing, consists of 2 steps: analysis of model behavior and model evaluation. In this research, the method used to justify the structure of the model is expert judgment; 4) implementation, consists of 2 steps: policy analysis and model use. At the implementation stage, the method used to test the policies is experimental approach; while to generate discussion among stakeholders is focus group. This research is only carried out until the 3rd stage.

SD has a set of qualitative tools that are used to analyze various dynamic processes, e.g., causal loop diagram (CLD) and flow diagram (FD) (Honti et al., 2019). CLD is a structure that functions to describe the feedback relationship between variables qualitatively (Moeis et al., 2020). In CLD there are two types of loops: reinforcing loop (R) and balancing loop (B) (Fig. 2 (a)). A strengthening relationship (R) will occur if X increases, then Y also increases; an increase in Y will cause an increase in X again. A balancing relationship (B) will occur if Y increases, then Z also increases; increasing Z will decrease Y (Sjaifuddin, 2020). After the CLD has been formed, an FD (Figure 2 (b)) is built. FD is a dynamic model structure built by several components: levels, rates, and auxiliaries (Walrave & Raven, 2016). In the FD, information accumulation in the system is centered on the *levels (stocks)*; the rate of change in the volume of information is represented by the *rates (flows)*; while intermediate variables that contain various calculations involving other variables are shown by *auxiliaries*. There are two other components in FD: *constants* and *connectors*. Constants are fixed values that affect certain variables, while connectors show links between components in the model.
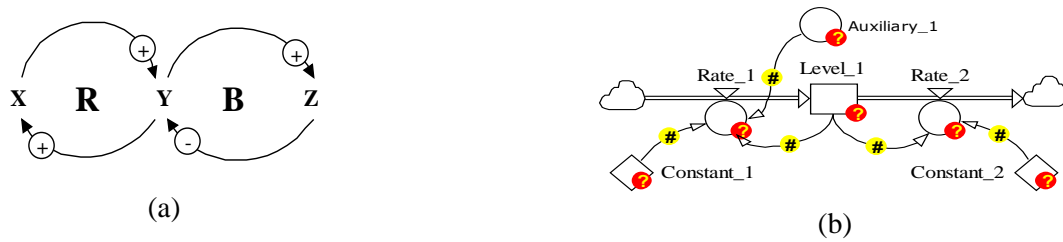
Fig. 2. Simple causal loop diagram (a) and flow diagram (b)

4. Result and Discussion

4.1. Causal Loop Diagram

CLD on sustainable management of freshwater swamp forest as an ecotourism destination in Indonesia is presented in Fig. 3. This CLD has 3R and 2B. R1 shows a mutually reinforcing relationship between environmental investment and local community income. The greater the environmental investment, the intensity of local community empowerment will be higher; this condition drives the increasing local community income. Conversely, a higher local community income will encourage more intensive conservation efforts; this condition drives the greater environmental investment. R2 shows the mutually reinforcing relationship between environmental investment and community independence. The greater the environmental investment, the intensity of local community empowerment will be higher; this condition then drives higher access to resources, so that the impact on community independence is also higher. Conversely, a higher community independence will encourage greater environmental investment. R3 shows the mutually reinforcing relationship between environmental investment and conservation efforts. The greater the environmental investment, the higher the conservation efforts. Conversely, the higher the conservation efforts, the greater the environmental investment.

Fig. 3. CLD on sustainable management of freshwater swamp forest as an ecotourism destination in Indonesia

B1 shows a mutually balancing relationship between tourists and waste management. The greater the number of tourists, the greater the tourism revenue; this condition then encourages greater environmental investment, which will be used for more intensive waste management. Conversely, the higher intensity of waste management will cause a lower volume of solid waste; this condition will encourage a greater number of tourists. B2 shows a mutually balancing relationship between tourists and biodiversity. The greater number of tourists will have a greater environmental impact; this will lead to lower biodiversity. Conversely, low biodiversity will cause a decreasing number of tourists.

4.2. Flow Diagram

Flow diagrams are presented in Fig. 4 is built based on the CLD in Fig. 3, and named Freshwater swamp forest model (FSFM). FSFM has 3 sub-models: social sub-model (red), economic sub-model (blue), and biophysical sub-model (black). The social sub-model is a main model that has 1 level: 'tourists' and 2 auxiliaries: 'local community empowerment' and 'environmental impact management'. The economic sub-model is a co-model that has 2 levels: 'local community income' and 'environmental investment'. The biophysical sub-model is a co-model that has 4 levels: 'conversion of forest land', 'swamp water reserves', 'solid waste', and 'biodiversity'.
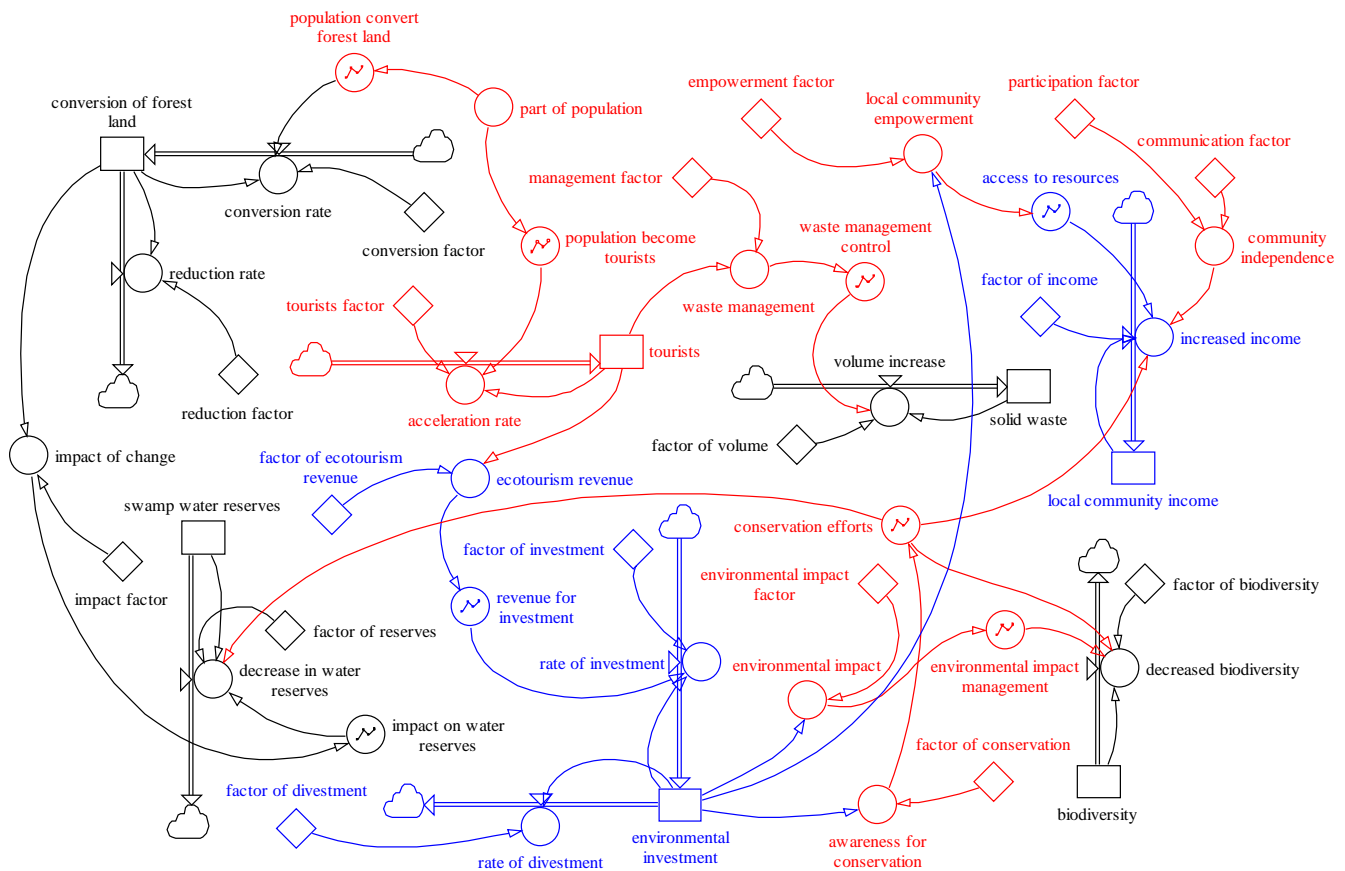
Fig. 4. Freshwater swamp forest model (FSFM)

'Tourists'

Based on Fig. 4, 'tourists' is a stock with an initial value of 12.584 people. 'Tourists' increase through the 'acceleration rate' which functions as a flow that has the equation: tourists*'tourists factor'*'population become tourists'. The graph function 'population become tourists' has an equation: GRAPHCURVE

(population;0;0,1;{0,127;0,17;0,22;0,3;0,34;0,39;0,51;0,74;0,827;0,84//Min:0;Max:1//}). As a constant, 'tourists factor' has a value of 0.15 1 / year. 'Part of population' is an auxiliary which has a value of 2. 'Population convert forest land' is a graph function that has an equation: GRAPHCURVE (population; 0;0,1;{0,32;0,36;0,367;0,37; 0,387;0,467;0,65;0,807;0,87;0,89//Min:0;Max:1//}). As an auxiliary, 'waste management' has an equation: tourists*'management factor'. 'Waste management control' is a graph function that has an equation: GRAPHCURVE('waste management';0;0,1;{0,52;0,307;0,167;0,11;0,1;0,19;0,33;0,45;0,49;0,4//Min:0;Max:1//}). As a constant, 'management factor' has a value of 1.4 1 / people. All values and equations related to 'tourists' are shown in Table 2.

Table 2. Values and equations related to 'tourists'

Components	Values	Equations
tourists (stock)	12584 people	
acceleration rate (flow)		tourists*'tourists factor'*'population become tourists'
tourists factor (constant)	0,15 1/year	
population become tourists (graph function)		GRAPHCURVE(population;0;0,1;{0,127;0,17;0,22;0,3;0,34;0,39; 0,51;0,74;0,827;0,84//Min:0;Max:1//})
part of population (auxiliary)	0,2	
population convert forest land (graph function)		GRAPHCURVE(population;0;0,1;{0,32;0,36;0,367;0,37;0,387; 0,467;0,65;0,807;0,87;0,89//Min:0;Max:1//})
waste management (auxiliary)		tourists*'management factor'
waste management control (graph function)		GRAPHCURVE('waste management';0;0,1;{0,52;0,307;0,167;0,11;0,1;0,19; 0,33;0,45;0,49;0,4//Min:0;Max:1//})
management factor (constant)	1,4 1/people	

'Local community empowerment'

Fig. 4 shows that 'local community empowerment' is an auxiliary with an equation: 'empowerment factor'*'environmental investment'. 'Community independence' is also an auxiliary that has an equation: 'participation factor' * 'communication factor'. As a constant, 'communication factor' has a value of 5.1 1 / people; 'participation factor' is 0.05 people; while the 'empowerment factor' is 0.1 1 / percent. All values and equations related to 'local community empowerment' are shown in Table 3.

Table 3. Values and equations related to 'local community empowerment'

Components	Values	Equations
local community empowerment (auxiliary)		'empowerment factor'*'environmental investment'
community independence (auxiliary)		'participation factor'*'communication factor'
communication factor (constant)	5,1 1/people	
participation factor (constant)	0,05 people	
empowerment factor (constant)	0,1 1/percent	

'Environmental impact management'

According to Fig. 4, 'environmental impact management' is a graph function that has an equation: GRAPHCURVE('environmental impact';0;0,1;{0,15;0,22;0,287;0,34;0,38;0,407;0,53;0,66;0,71;0,66//Min:0;Max: 1//}). 'Environmental impact' is an auxiliary that has an equation: 'environmental investment'*'environmental impact factor'. 'Awareness for conservation' is also an auxiliary with an equation: 'environmental investment'*'factor of conservation'. The 'conservation efforts' is a graph function with an equation: GRAPHCURVE('awareness for conservation';0; 0,1;{0,207;0,227;0,22;0,207;0,19;0,267;0,467;0,77;0,84;0,847// Min:0;Max:1//}). As a constant, 'environmental impact factor' has a value of 0.00000002 1 / percent; while the 'factor of conservation' is 0.1 1 / percent. All values and equations related to 'environmental impact management' are shown in Table 4.

'Local community income'

Based on Fig. 4, 'local community income' is a stock with an initial value of 3,5 million Rupiah. 'Local community income' increases through 'increased income', a flow that has an equation: 'community independence'*'access to resources'*'conservation efforts'*'local community income'*'factor of income'. 'Access to resources' is a graph function with an equation: GRAPHCURVE('local community empowerment'; 0;0,1;{0,91;0,287;0,23;0,24;0,28;0,45; 0,53;0,607;0,69;0,71//Min:0;Max:1//}). As a constant, 'factor of income' has a value of 1,11 1/year**.** All values and equations related to 'local community income' are shown in Table 5.

Table 4. Values and equations related to 'environmental impact management'

Components	Values	Equations
environmental impact management (graph function)		GRAPHCURVE('environmental impact';0;0,1;{0,15;0,22;0,287;0,34;0,38;0,407; 0,53;0,66;0,71;0,66//Min:0;Max:1//})
environmental impact (auxiliary)		'environmental investment'*'environmental impact factor'
awareness for conservation (auxiliary)		'environmental investment'*'factor of conservation'
conservation efforts (graph function)		GRAPHCURVE('awareness for conservation';0;0,1;{0,207;0,227;0,22;0,207;0,19;0,267; 0,467;0,77;0,84;0,847//Min:0;Max:1//})
environmental impact factor (constant)	0,00000002 1/percent	
factor of conservation (constant)	0,1 1/percent	

Table 5. Values and equations related **to 'local community income'**

Components	Values	Equations
local community income (stock)	3.500.000 Rupiah (Rp)	
increased income (flow)		'community independence'*'access to resources'*'conservation efforts'*'local community income'*'factor of income'
access to resources (graph function)		GRAPHCURVE('local community empowerment'; 0;0,1;{0,91;0,287;0,23;0,24;0,28;0,45; 0,53;0,607;0,69;0,71//Min:0;Max:1//})
factor of income (constant)	1,11 1/year	

'Environmental investment'

Based on Fig. 4, 'environmental investment' is a stock with an initial value of 0,2 percent. 'Environmental investment' increases through 'rate of investment', a flow that has an equation: 'revenue for investment'*'environmental investment'*'factor of investment'. 'Environmental investment' also decreases through 'rate of divestment', a flow that has an equation: 'environmental investment'*'factor of divestment'. As a constant, 'factor of investment' has a value of 0,7 1/year; while the 'factor of divestment' is 0,1 1/year**.** 'Revenue for investment' is a graph function with an equation: GRAPHCURVE('ecotourism revenue' ;0;0,1;{0,1;0,2;0,2;0,227;0,28;0,45;0,76;0,88;0,9;0,9//Min:0;Max:1//}). 'Ecotourism revenue' is an auxiliary with an equation: ecotourists*'factor of ecotourism revenue'. As a constant, 'factor of ecotourism revenue' has a value of 0,0006 1/people. All values and equations related to 'environmental investment' are shown in Table 6.

'Conversion of forest land'

According to Fig. 4, 'conversion of forest land' is a stock with an initial value of 8,57 hectares. This stock increases through 'conversion rate', a flow that has an equation: 'population convert forest land'*'conversion of forest land'*'conversion factor'. This stock decreases through 'reduction rate', a flow that has an equation: 'conversion of forest land'*'reduction factor'. As a constant, 'reduction factor' has a value of 0,3 1/year**;** while the 'conversion factor' is 0,001 1/year, and 'impact factor' is 0,2 1/hectare. 'Impact of change' is an auxiliary with an

equation: 'conversion of forest land'*'impact factor'. All values and equations related to 'conversion of forest land' are shown in Table 7.

Table 6. Values and equations related to 'environmental investment'

Components	Values	Equations
environmental investment (stock)	0,2 percent	
rate of investment (flow)		'revenue for investment'*'environmental investment'*'factor of investment'
rate of divestment (flow)		'environmental investment'*'factor of divestment'
factor of investment (constant)	0,7 1/year	
factor of divestment (constant)	0,1 1/year	
factor of ecotourism revenue (constant)	0,0006 1/people	
ecotourism revenue (auxiliary)		ecotourists*'factor of ecotourism revenue'
revenue for investment (graph function)		GRAPHCURVE('ecotourism revenue';0;0,1;{0,1;0,2;0,2;0,227;0,28;0,45;0,76;0,88;0,9;0,9//Min:0;Max:1//})

Table 7. Values and equations related to 'conversion of forest land'

Components	Values	Equations
Conversion of forest land (stock)	8,57 hectare	
conversion rate (flow)		'population convert forest land'*'conversion of forest land'*'conversion factor'
reduction rate (flow)		'conversion of forest land'*'reduction factor'
reduction factor (constant)	0,3 1/year	
conversion factor (constant)	0,001 1/year	
impact of change (auxiliary)		'conversion of forest land'*'impact factor'
impact factor (constant)	0,2 1/hectare	

'Swamp water reserves'

Fig. 4 shows that 'swamp water reserves' is a stock with an initial value of 500 million m^3 (expert estimates). This stock decreases through 'decrease in water reserves', a flow that has an equation: 'impact on water reserves'*'conservation efforts'*'swamp water reserves'*'factor of reserves'. 'Impact on water reserves' is a graph function with an equation: GRAPHCURVE('impact of change';0;0,1;{0,147;0,4;0,547;0,63;0,727;0,78;0,81; 0,82;0,847;0,85//Min:0;Max:1//}). As a constant, 'factor of reserves' has a value of 0,000001 1/year. All values and equations related to 'swamp water reserves' are shown in Table 8.

Table 8. Values and equations related to 'swamp water reserves'

Components	Values	Powersim Equations
swamp water reserves (stock)	500.000.000 m^3	
decrease in water reserves (flow)		'impact on water reserves'*'conservation efforts'*'swamp water reserves'*'factor of reserves'
factor of reserves (constant)	0,000001 1/year	
impact on water reserves (graph function)		GRAPHCURVE('impact of change';0;0,1;{0,147;0,4;0,547;0,63;0,727;0,78;0,81;0,82;0,847;0,85//Min:0;Max:1//})

'Solid waste'

Based on Fig.4, it is known that 'solid waste' is a stock with an initial value of 62.986 kilograms. This stock increases through 'volume increase', a flow that has an equation: 'waste management control'*'solid waste'*'factor of volume'. As a constant, 'factor of volume' has a value of 0,00003 1/year. All values and equations related to 'solid waste' are shown in Table 9.

Table 9. Values and equations related to 'solid waste'

Components	Values	Equations
solid waste (stock)	62.986 kilograms	
volume increase (flow)		'waste management control'*'solid waste'*'factor of volume'
factor of volume (constant)	0,00003 1/year	

'Biodiversity'

According to Fig. 4, 'biodiversity' is a stock with an initial value of 95 percent (expert estimates). This stock decreases through 'decreased biodiversity', a flow that has an equation: 'conservation efforts'*'environmental impact management'*biodiversity*'factor of biodiversity'. As a constant, 'factor of biodiversity' has a value of 0,01 1/year. All values and equations related to 'biodiversity' are shown in Table 10.

Table 10. Values and equations related to 'biodiversity'

Components	Values	Equations
Biodiversity (stock)	95 percent	
decreased biodiversity (flow)		'conservation efforts'*'environmental impact management'*biodiversity*'factor of biodiversity'
factor of biodiversity (constant)	0,01 1/year	

4.3. Model simulation

A model simulation is performed to find out the system behavior. By using the euler method (fixed step) at the 1st order, the simulation starts in 2020 until 2030. In this research, the simulation uses 3 scenarios of ecotourism management: 1) deep ecotourism which is oriented towards very strong/strong sustainability, 2) shallow ecotourism oriented to weak sustainability, and 3) mass tourism which is oriented towards very weak sustainability (Acott et al., 1998). There are several assumptions used in the simulation: 1) stable and controlled biophysical environmental conditions (e.g., no disaster occurs), 2) consistent tourism policies, 3) maintaining political and security stability.

The growth of tourists during the 10-year simulation is shown in Fig. 5(a). In the mass tourism scenario, the number of tourists grows exponentially, consequently at the end of the simulation period the number of tourists increased by more than 240% (from 12,584 peoples to 42,853 people). In the shallow ecotourism scenario, the number of tourists increased by 103.3% (from 12,584 people to 25,587 people), while in the deep ecotourism scenario, the number of tourists increased by 38.4% (from 12,584 people to 17,411 people). The large number of tourists will increase the consumption of tourism resources and produce a large volume of waste, because mass tourism greatly exploits natural resources and the environment (Cianga, 2017). In addition, it also becomes a heavy social burden due to increased crime, prostitution, and other social problems (Das & Chatterjee, 2015). Mass tourism in Bali, for example, has had a significant impact: 1) a big burden on waste management, 2) traffic congestion, 3) cultural dilution, 4) tourist misbehaviour (Chong, 2020). In the shallow ecotourism scenario, the number of tourists increased by 103.3% (from 12,584 people to 25,587 people). This increase is considered still quite large and has the potential to burden the environment. In the deep ecotourism scenario, the number of tourists increased by 38.4% (from 12,584 people to 17,411 people). This condition is considered as a fairly logical growth because it is not too high so it does not burden the environment.

| (a) | (b) |
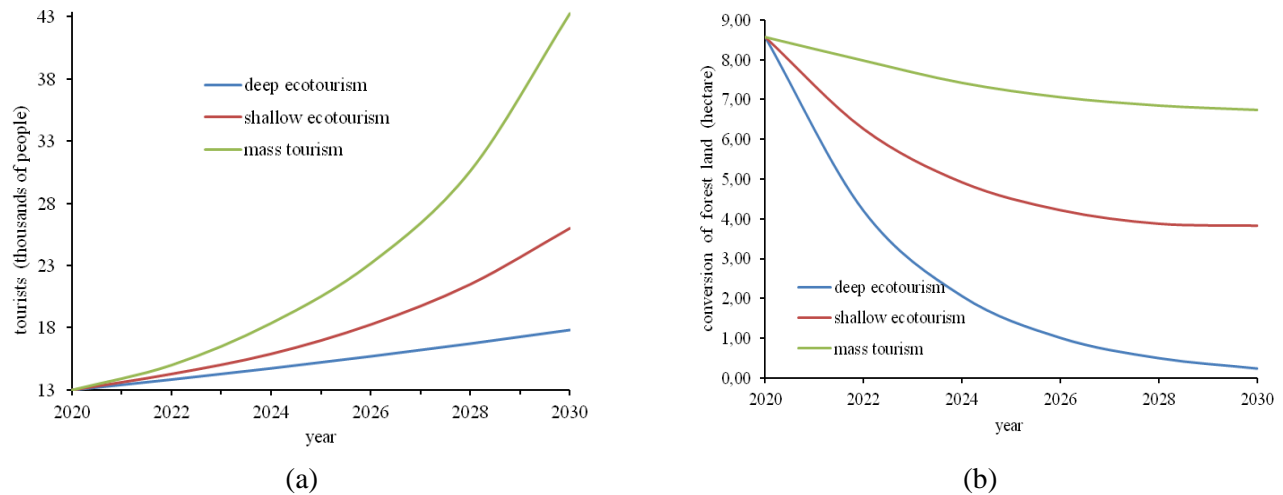
Fig. 5. Growth patterns of tourist numbers (a) and conversion of forest land (b) according to 3 scenarios of ecotourism management

Decreased area of converted forest land during the 10-year simulation is shown in Figure 5(b). In the deep ecotourism scenario, almost all converted forest land (97.2%) has been successfully reforested (from 8.57 hectares in 2020 remaining 0.24 hectare in 2030). This condition shows that the deep ecotourism scenario has successfully restored forest functions well. In the mass tourism scenario, the area of converted forest land only decreased by 21.4% (from 8.57 hectares in 2020 to 6.74 hectares in 2030); while in the shallow tourism scenario, the area of converted forest land decreased by 55.3% (from 8.57 hectares in 2020 to 3.83 hectares in 2030). This condition shows that the two scenarios have not been able to reforest converted land. In relation to climate change mitigation, maintaining forest functions is very important. Research by Suwarno et al. (2018) shows that forest conversion moratorium in West Kotawaringin and Kapuas Regency (Indonesia) is able to reduce the potential of CO_2 emissions by 15%-23%. In another aspect, forest land conversion will also affect the number and composition of litterfall. This condition will certainly affect the content of organic matter and soil nutrient cycles which will then have an impact on soil microbial diversity (Yu et al., 2012). Deforestation also results in lower soil quality, for example, it was demonstrated by decreasing levels of organic carbon and microbial biomass carbon (Rasouli-Sadaghiani et al., 2018).

The growth of local community income during the 10-year simulation is shown in Fig. 6(a). In the deep ecotourism scenario, there was a 28.6% growth in local community income (from Rp. 3,500,000 in 2020 to Rp. 4,500,522 in 2030). In the shallow ecotourism scenario, the growth of local community income is only 16.8% (from Rp. 3,500,000 in 2020 to Rp. 4,089,368 in 2030); while in the mass tourism scenario, there was a very significant decrease in local community income: 49.3% (from Rp. 3,500,000 in 2020 to only Rp. 1,775,644 in 2030). This condition shows that the deep ecotourism scenario is the best alternative for increasing local community income. This is in line with the principle of ecotourism that develops in areas with high biodiversity but is still able to achieve economic benefits and ecological conservation (Brandt & Buckley, 2018). Ecotourism in this region is still able to maintain traditional values, create jobs for local people, and provide income for people who were previously unemployed (Scheyvens & Scheyvens, 2015). Declining local community income in the mass tourism scenario is possible because almost all dimensions of mass tourism are controlled by large capital owners, so that the local community is marginalized.

(a)   (b)
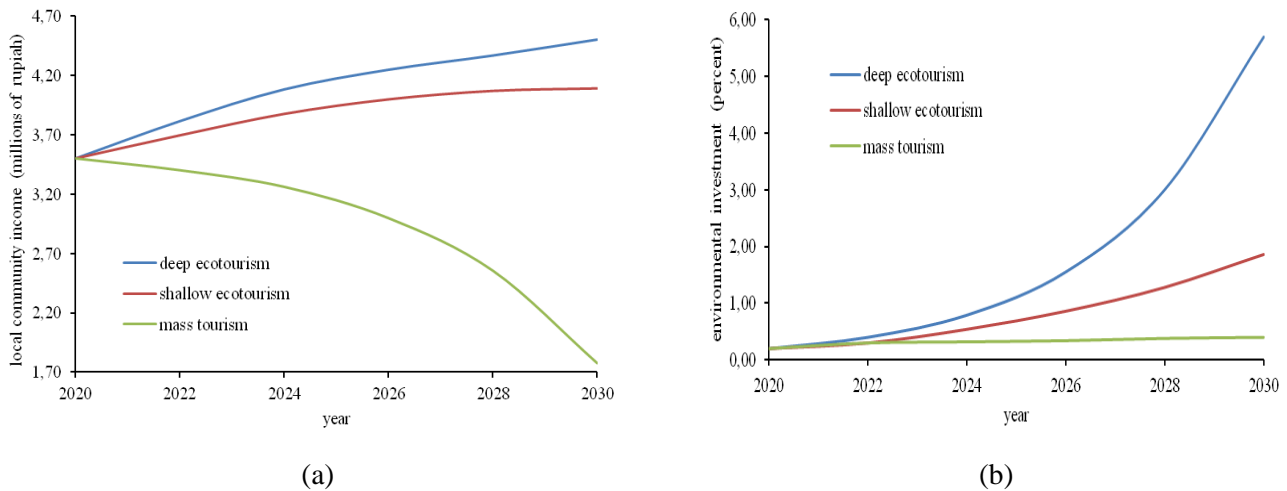
Fig. 6. Growth patterns of local community income (a) and environmental investment (b) according to 3 scenarios of ecotourism management

Growth in environmental investment during the 10-year simulation is shown in Figure 6 (b). In the deep ecotourism scenario, there is an environmental investment growth of 2,745% (from 0.2% in 2020 to 5.69% in 2030). In the shallow ecotourism scenario there is an 830% growth (from 0.2% in 2020 to 1.86% in 2030); while in the mass tourism scenario 100% growth occurs (from 0.2% in 2020 to 0.4% in 2030). This condition shows that the deep ecotourism scenario is the best alternative for environmental investment growth. A well-grown environmental investment will trigger an increase in environmental performance. Environmental performance is an effective solution to reduce problems due to over-utilization of resources (Jin-Fang et al., 2020). Environmental investment implemented in the service sector greatly impacts on reducing costs through more efficient use of resources such as energy and water. Environmental investment has now become the choice because with only a small investment, measurable economic benefits will soon be obtained (Bagur-Femenías et al., 2015).

The decline in biodiversity during the 10-year simulation is shown in Figure 7 (a). In the deep ecotourism scenario, there is a relatively small reduction in biodiversity (0.33%) (from 95.0% in 2020 to 94.69% in 2030). In the shallow ecotourism scenario there was a reduction of 13.44% (from 95.0% in 2020 to 82.23% in 2030); while in the mass tourism scenario there was a reduction of 41.11% (from 95.0% in 2020 to 53.89% in 2030). This condition shows that the deep ecotourism scenario is the best alternative to maintain biodiversity. Biodiversity is a source of inspiration and recreation, maintaining the availability of water, producing oxygen, maintaining climate stability, as a source of food, and a source of genetic material that is very important for agriculture and industry (Slootweg, 2005). Throughout the history of civilization, humans have over exploited the nature (including biodiversity). To avoid the threat of mass extinctions, one important strategy is to limit human behavior so that it remains within the tolerance limits of the earth's ecosystems (Raven & Wackernagel, 2020).

The decrease of swamp water reserves during the 10-year simulation is shown in Figure 7(b). In the deep ecotourism scenario, there is a relatively small decrease in swamp water reserves (0,0001%) (from 500 million m^3 in 2020 to 499.9 million m^3 in 2030). In the shallow ecotourism scenario there is a decrease of 19.5% (from 500 million m^3 in 2020 to 402.7 million m^3 in 2030); while in the mass tourism scenario there was a decrease of 62.1% (from 500 million m^3 in 2020 to 189.4 million m^3 in 2030). This condition shows that the deep ecotourism scenario is the best alternative to maintain swamp water reserves. Rawa Danau FSF must be maintained so as not to be converted into agricultural land, settlements or other uses. The research of Peter et al. (2018) shows that forest land conversion has very serious implications on the ability of forests to maintain water resources. Water

availability is a crucial factor because billions of people worldwide currently live in water insecurity conditions (Stoler et al., 2020). To get clean water, people have to pay a high price, even disproportionately compared to household income.
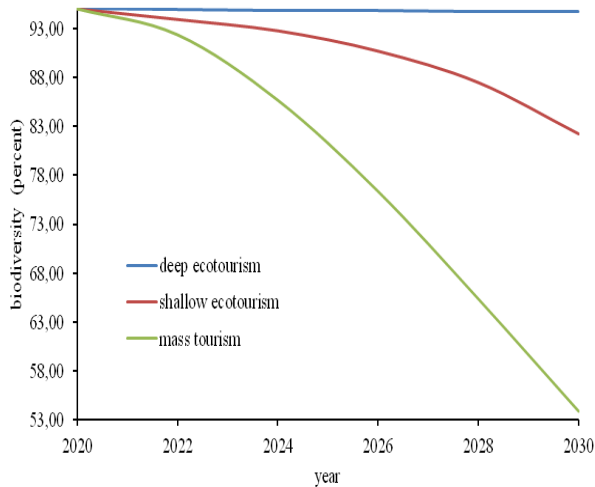
(a)
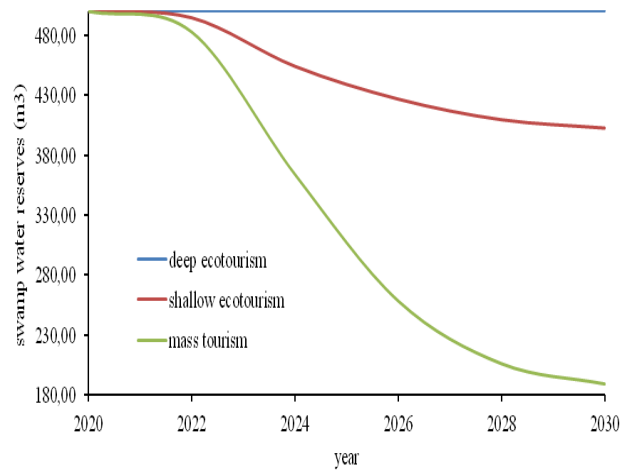
(b)
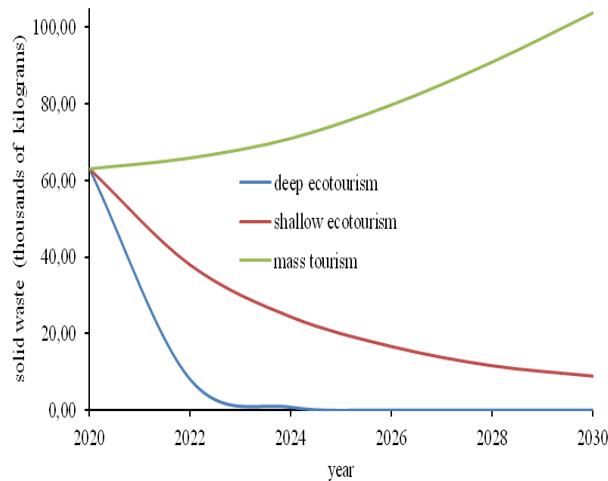
(c)

Fig. 7. Growth patterns of biodiversity (a), swamp water reserves (b), and volume of solid waste (c) according to 3 scenarios of ecotourism management

The decrease in the volume of solid waste during the 10-year simulation is shown in Figure 7(c). In the deep ecotourism scenario, there is a significant decrease in the volume of solid waste (99.9%) (from 62,986 kilograms in 2020 to 0.08 kilograms in 2030). In the shallow ecotourism scenario, there was a decrease of 85.8% (from 62,986 kilograms in 2020 to 8,926.47 kilograms in 2030). In the mass tourism scenario, the volume of solid waste actually increased by 64.6% (from 62,986 kilograms in 2020 to 103,682.72 kilograms in 2030). This condition shows that the deep ecotourism scenario is the best alternative to reduce the volume of solid waste. Mismanagement of solid waste has a negative impact on the environment and health, reducing productivity and economic growth (Serge Kubanza & Simatele, 2020). For this reason, solid waste management must be carried

out effectively and institutionalized by involving the government, private sector and community participation. Effective management of solid waste will involve all of these components with several principles: 1) understanding of the factors driving the emergence of solid waste, 2) the seriousness of stakeholders in preventing and reducing solid waste, 3) understanding the determinants of successful management (Filimonau & Tochukwu, 2020).

4.4. Model Validation

The ability of the model to describe the real state can be determined through model validation. In this study the construction validity test is used, aiming to show that the structure of the model being constructed is logical. The simulation shows that the number of tourists in the mass tourism scenario increases exponentially (Fig.5a). Its orientation on very weak sustainability causes this scenario to be able to increase the volume of solid waste rapidly (Fig.7c), significantly reduced biodiversity (Fig.7a), and drastically reduce swamp water reserves (Fig.7b). The mass tourism scenario also significantly reduces local community income (Fig. 6a), also drastically decreased environmental investment (Fig. 6b). The illustration above shows that the simulation of the model has followed the logical thinking pattern of mass tourism and relevant to the basics of systems archetype (Kim and Anderson, 1998). The simulation also shows that for 10 years, the number of tourists in the deep ecotourism scenario only increased slightly (Fig.5a). Its orientation to very strong sustainability causes this scenario to reduce the volume of solid waste rapidly (Fig.7c), maintain biodiversity (Fig.7a) and swamp water reserves (Fig.7b). The deep ecotourism scenario can also increase local community income (Fig. 6a) and environmental investment (Fig. 6b). The simulation in this scenario is considered in line with the sustainable management policy of the Rawa Danau as an ecotourism destination in Indonesia.

Conclusions

Considering the various negative impacts of mass tourism, the development of environmentally friendly tourism is now an alternative. That is why people give great expectations to ecotourism, a concept of tourism that integrates economic, social, and ecological conservation interests. As a tropical lowland swamp forest that still remains in Java, the existence of Rawa Danau as an ecotourism destination is important to be explored, because its utilization has not followed the principles of sustainable management. Various problems arise as an impact of mismanagement, e.g.: decrease in forest area due to land conversion, decreased water storage capacity, low local people's income, and empowerment of local communities who do not reach the target. For this reason, a dynamic modeling is then made that integrates various factors in the biophysical, social, and economic dimensions to obtain the best alternative management of ecotourism destinations in the future. Management alternatives are designed in three scenarios: deep ecotourism oriented to very strong/strong sustainability, shallow ecotourism oriented to weak sustainability, and mass tourism oriented to very weak sustainability. System dynamics is used as a method in this study because of its ability to: 1) explore the long-term ecotourism development policies, 2) provide answers to the 'what-if' questions through feedback loops that are built between variables in the system. The results show that deep ecotourism is the most suitable scenario to be implemented in the sustainable management of Rawa Danau as an ecotourism destination in Indonesia. Through this scenario, the control of several parameters that were successfully carried out during the 10 years of simulation are as follows: 1) restrain the growth rate of tourist numbers, the number increased by only 38.4% (from 12,584 people in 2020 to 17,411 people in 2030). This condition is considered as a fairly logical growth because it is not too high so it does not burden the environment, 2) reforesting almost all converted forest land (97.2%) (from 8.57 hectares in 2020 remaining 0.24 hectare in 2030). This condition shows that through this scenario the restoration of forest function is going well, 3) local community income increased by 28.6% (from Rp. 3,500,000 in 2020 to Rp. 4,500,522 in 2030). This condition shows that through this scenario the local community gets adequate economic benefits from ecotourism activities, 4) environmental investment increased by 2,745% (from 0.2% in 2020 to 5.69% in 2030). This condition shows that stakeholders are able to obtain benefits economically, ecologically, and socially

in an integrated manner, 5) biodiversity reduction is relatively small (0.33%) (from 95.0% in 2020 to 94.69% in 2030). This condition shows that through this scenario biodiversity can be maintained well, 6) the decrease in swamp water reserves is relatively small (0.0001%) (from 500 million m^3 in 2020 to 499.9 million m^3 in 2030). This condition shows that through this scenario swamp water reserves can be maintained properly, 7) a significant decrease in the volume of solid waste (99.9%) (from 62,986 kilograms in 2020 to 0.08 kilograms in 2030). This condition shows that this scenario is able to reduce the rate of increase in solid waste volume so that it does not burden the environment.

References

Acott, T. G., La Trobe, H. L. L., & Howard, S. H. (1998). An evaluation of deep ecotourism and shallow ecotourism. *Journal of Sustainable Tourism*, *6*(3), 238–253. https://doi.org/10.1080/09669589808667314

Addinsall, C., Scherrer, P., Weiler, B., & Glencross, K. (2017). An ecologically and socially inclusive model of agritourism to support smallholder livelihoods in the South Pacific. *Asia Pacific Journal of Tourism Research*, *22*(3), 301–315. https://doi.org/10.1080/10941665.2016.1250793

Akis, A. (2011). The effects of mass tourism: A case study from Manavgat (Antalya - Turkey). *Procedia - Social and Behavioral Sciences*, *19*, 289–296. https://doi.org/10.1016/j.sbspro.2011.05.134

Aliani, H., Kafaky, S. B., Monavari, S. M., & Dourani, K. (2018). Modeling and prediction of future ecotourism conditions applying system dynamics. *Environmental Monitoring and Assessment*, *190*(12). https://doi.org/10.1007/s10661-018-7078-4

Alipour, H., & Arefipour, T. (2020). Rethinking potentials of Co-management for sustainable common pool resources (CPR) and tourism: The case of a Mediterranean island. *Ocean and Coastal Management*, *183*(April), 104993. https://doi.org/10.1016/j.ocecoaman.2019.104993

Anup, K. C., Rijal, K., & Sapkota, R. P. (2015). Role of ecotourism in environmental conservation and socioeconomic development in Annapurna conservation area, Nepal. *International Journal of Sustainable Development and World Ecology*, *22*(3), 251–258. https://doi.org/10.1080/13504509.2015.1005721

Baustian, M. M., Clark, F. R., Jerabek, A. S., Wang, Y., Bienn, H. C., & White, E. D. (2018). Modeling current and future freshwater in flow needs of a subtropical estuary to manage and maintain forested wetland ecological conditions. *Ecological Indicators*, *85*(October 2017), 791–807. https://doi.org/10.1016/j.ecolind.2017.10.005

Bagur-Femenías, L., Perramon, J., & Amat, O. (2015). Impact of quality and environmental investment on business competitiveness and profitability in small service business: the case of travel agencies. *Total Quality Management and Business Excellence*, *26*(7–8), 840–853. https://doi.org/10.1080/14783363.2014.895523

Biggsa, D., Turpieb, J., Fabriciusc, C., & Spenceleyd, A. (2011). The value of avitourism for conservation and job creation - An analysis from South Africa. *Conservation and Society*, *9*(1), 80–90. https://doi.org/10.4103/0972-4923.79198

Brandt, J. S., & Buckley, R. C. (2018). A global systematic review of empirical evidence of ecotourism impacts on forests in biodiversity hotspots. *Current Opinion in Environmental Sustainability*, *32*, 112–118. https://doi.org/10.1016/j.cosust.2018.04.004

Cavallaro, F., Galati, O. I., & Nocera, S. (2017). Policy Strategies for the Mitigation of GHG Emissions caused by the Mass-Tourism Mobility in Coastal Areas. *Transportation Research Procedia*, *27*, 317–324. https://doi.org/10.1016/j.trpro.2017.12.062

Cesar, A., Pinha, H., & Sagawa, J. K. (2020). A system dynamics modelling approach for municipal solid waste management and financial analysis. *Journal of Cleaner Production*, 122350. https://doi.org/10.1016/j.jclepro.2020.122350

Chong, K. L. (2020). The side effects of mass tourism: the voices of Bali islanders. *Asia Pacific Journal of Tourism Research*, *25*(2), 157–169. https://doi.org/10.1080/10941665.2019.1683591

Cianga, N. (2017). the Impact of Tourism Activities. a Point of View. *Risks and Catastrophes Journal*, *20*(1/2017), 25–40. https://doi.org/10.24193/rcj2017_02

Cisneros-Montemayor, A. M., Becerril-García, E. E., Berdeja-Zavala, O., & Ayala-Bocos, A. (2019). Shark ecotourism in Mexico: Scientific research, conservation, and contribution to a Blue Economy. In *Advances in Marine Biology* (1st ed.). Elsevier Ltd. https://doi.org/10.1016/bs.amb.2019.08.003

Cobbinah, P. B. (2015). Contextualising the meaning of ecotourism. *Tourism Management Perspectives*, *16*, 179–189. https://doi.org/10.1016/j.tmp.2015.07.015

D'Cruze, N., Machado, F. C., Matthews, N., Balaskas, M., Carder, G., Richardson, V., & Vieto, R. (2017). A review of wildlife ecotourism in Manaus, Brazil. *Nature Conservation*, *22*, 1–16. https://doi.org/10.3897/natureconservation.22.17369

Daneshzand, F., Amin-naseri, M. R., Asali, M., Elkamel, A., & Fowler, M. (2019). A system dynamics model for optimal allocation of natural gas to various demand sectors. *Computers and Chemical Engineering*, *128*, 88–105. https://doi.org/10.1016/j.compchemeng.2019.05.040

Das, M., & Chatterjee, B. (2015). Ecotourism: A panacea or a predicament? *Tourism Management Perspectives*, *14*, 3–16. https://doi.org/10.1016/j.tmp.2015.01.002

Diaz-Farina, E., Díaz-Hernández, J. J., & Padrón-Fumero, N. (2020). The contribution of tourism to municipal solid waste generation: A mixed demand-supply approach on the island of Tenerife. *Waste Management*, *102*, 587–597. https://doi.org/10.1016/j.wasman.2019.11.023

Drdácký, M., & Drdácký, T. (2010). Risks generated by tourism in an environment with cultural heritage assets. *International Preservation News: A Newsletter of the IFLA Core Activity on Preservation and Conservation; Tourism and Preservation: Some Challenges*, *52*(52), 12–17.

Dwomoh, F. K., Wimberly, M. C., Cochrane, M. A., & Numata, I. (2019). Forest degradation promotes fire during drought in moist tropical forests of Ghana. *Forest Ecology and Management*, *440*(March), 158–168. https://doi.org/10.1016/j.foreco.2019.03.014

e-Review of Tourism Research (eRTR), Vol. 17, No. 4, 2019 http://ertr.tamu.edu. (2019). *17*(4), 633–643.

El-Sefy, M., Ezzeldin, M., El-Dakhakhni, W., Wiebe, L., & Nagasaki, S. (2019). System dynamics simulation of the thermal dynamic processes in nuclear power plants. *Nuclear Engineering and Technology*, *51*(6), 1540–1553. https://doi.org/10.1016/j.net.2019.04.017

Fantinato, E. (2019). The impact of (mass)tourism on coastal dune pollination networks. *Biological Conservation*, *236*(May), 70–78. https://doi.org/10.1016/j.biocon.2019.05.037

Filimonau, V., & Tochukwu, C. O. (2020). Exploring managerial approaches to mitigating solid waste in hotels of Lagos, Nigeria. *Journal of Cleaner Production*, 122410. https://doi.org/10.1016/j.jclepro.2020.122410

Gabarda-Mallorquí, A., Garcia, X., & Ribas, A. (2017). Mass tourism and water efficiency in the hotel industry: A case study. *International Journal of Hospitality Management*, *61*, 82–93. https://doi.org/10.1016/j.ijhm.2016.11.006

Gallagher, A. J., & Hammerschlag, N. (2011). Global shark currency: The distribution frequency and economic value of shark ecotourism. *Current Issues in Tourism*, *14*(8), 797–812. https://doi.org/10.1080/13683500.2011.585227

Garau-Vadell, J. B., Gutierrez-Taño, D., & Diaz-Armas, R. (2018). Economic crisis and residents' perception of the impacts of tourism in mass tourism destinations. *Journal of Destination Marketing and Management*, *7*, 68–75. https://doi.org/10.1016/j.jdmm.2016.08.008

Harrison, M. E. (2013). Using conceptual models to understand ecosystem function and impacts of human activities in tropical peat-swamp forests. *Wetlands*, *33*(2), 257–267. https://doi.org/10.1007/s13157-013-0378-0

He, Y., Huang, P., & Xu, H. (2018). Simulation of a dynamical ecotourism system with low carbon activity: A case from western China. *Journal of Environmental Management*, *206*, 1243–1252. https://doi.org/10.1016/j.jenvman.2017.09.008

Honti, G., Dörgő, G., & Abonyi, J. (2019). Review and structural analysis of system dynamics models in sustainability science. *Journal of Cleaner Production*, *240*, 118015. https://doi.org/10.1016/j.jclepro.2019.118015

Howe, P. (2019). The triple nexus: A potential approach to supporting the achievement of the Sustainable Development Goals? *World Development*, *124*, 104629. https://doi.org/10.1016/j.worlddev.2019.104629

Hsu, P. hsiang. (2019). Economic impact of wetland ecotourism: An empirical study of Taiwan's Cigu Lagoon area. *Tourism Management Perspectives*, *29*(April 2018), 31–40. https://doi.org/10.1016/j.tmp.2018.10.003

Igu, N. I., & Marchant, R. (2016). Aboveground carbon storage in a freshwater swamp forest ecosystem in the Niger Delta. *Carbon Management*, *7*(3–4), 137–148. https://doi.org/10.1080/17583004.2016.1165355

Igu, N. I., & Marchant, R. (2017). Freshwater swamp forest use in the Niger Delta: Perception and insights. *Journal of Forest Research*, *22*(1), 44–52. https://doi.org/10.1080/13416979.2017.1280887

Ike, M., Donovan, J. D., Topple, C., & Masli, E. K. (2019). The process of selecting and prioritising corporate sustainability issues: Insights for achieving the Sustainable Development Goals. *Journal of Cleaner Production*, *236*, 117661. https://doi.org/10.1016/j.jclepro.2019.117661

Jamaliah, M. M., & Powell, R. B. (2018). Ecotourism resilience to climate change in Dana Biosphere Reserve, Jordan. *Journal of Sustainable Tourism*, *26*(4), 519–536. https://doi.org/10.1080/09669582.2017.1360893

Jere Jakulin, T. (2017). Systems Approach to Tourism: A Methodology for Defining Complex Tourism System. *Organizacija*, *50*(3), 208–215. https://doi.org/10.1515/orga-2017-0015

Jin-Fang, T., Chao, P., Rui, X., Xiao-Tong, Y., Chen, W., Xu-Zhao, J., & Yu-Li, S. (2020). Corporate innovation and environmental investment: The moderating role of institutional environment. *Advances in Climate Change Research*. https://doi.org/10.1016/j.accre.2020.05.003

Kim, D. H., and Anderson, V. (1998), *Systems archetype basics. From story to structure*, Pegasus, Communications, Inc. Waltham.

Liu, T. M., & Leung, K. K. (2019). Volunteer tourism, endangered species conservation, and aboriginal culture shock. *Biodiversity and Conservation*, *28*(1), 115–129. https://doi.org/10.1007/s10531-018-1639-2

Lu, X., Yao, S., Fu, G., Lv, X., & Mao, Y. (2019). Dynamic simulation test of a model of ecological system security for a coastal tourist city. *Journal of Destination Marketing and Management*, *13*(May), 73–82. https://doi.org/10.1016/j.jdmm.2019.05.004

Luna-Reyes, L. F., & Andersen, D. L. (2003). Collecting and analyzing qualitative data for system dynamics: Methods and models. *System Dynamics Review*, *19*(4), 271–296. https://doi.org/10.1002/sdr.280

Ma, B., Yin, R., Zheng, J., Wen, Y., & Hou, Y. (2019). Estimating the social and ecological impact of community-based ecotourism in giant panda habitats. *Journal of Environmental Management*, *250*(February), 109506. https://doi.org/10.1016/j.jenvman.2019.109506

Moeis, A. O., Desriani, F., Destyanto, A. R., Zagloel, T. Y., Hidayatno, A., & Sutrisno, A. (2020). Sustainability Assessment of the Tanjung Priok Port Cluster. *International Journal of Technology*, *11*(2), 353. https://doi.org/10.14716/ijtech.v11i2.3894

Mori, A. S., Lertzman, K. P., & Gustafsson, L. (2017). Biodiversity and ecosystem services in forest ecosystems: a research agenda for applied forest ecology. *Journal of Applied Ecology*, *54*(1), 12–27. https://doi.org/10.1111/1365-2664.12669

Omagor, N. (1999). Swamp forest plant resources in Uganda: Their uses and conservation challenges. *Forests Trees and Livelihoods*, *10*(2), 107–120. https://doi.org/10.1080/01435698.1999.9752998

Papageorgiou, A. N., & Lytras, P. N. (2015). The efficacy of alternative tourism development to overcome current crisis: An exploration of the views of the stakeholders of the prefecture of korinthia. *Tourismos*, *10*(2), 97–107.

Peter, A., Mujuru, M., & Dube, T. (2018). An assessment of land cover changes in a protected nature reserve and possible implications on water resources, South Africa. *Physics and Chemistry of the Earth*, *107*, 86–91. https://doi.org/10.1016/j.pce.2018.09.005

Pizzitutti, F., Walsh, S. J., Rindfuss, R. R., Gunter, R., Quiroga, D., Tippett, R., & Mena, C. F. (2017). Scenario planning for tourism management: a participatory and system dynamics model applied to the Galapagos Islands of Ecuador. *Journal of Sustainable Tourism*, *25*(8), 1117–1137. https://doi.org/10.1080/09669582.2016.1257011

Priyanto, B., & Titiresmi, T. (2006). Beberapa Aspek Rawa Danau Sebagai Sumber Air Baku. *J. Tek. Ling*, *7*(3), 277–283.

Rasouli-Sadaghiani, M. H., Barin, M., Siavash Moghaddam, S., Damalas, C. A., & Ghodrat, K. (2018). Soil quality of an Iranian forest

ecosystem after conversion to various types of land use. *Environmental Monitoring and Assessment*, *190*(8). https://doi.org/10.1007/s10661-018-6815-z

Raven, P., & Wackernagel, M. (2020). Maintaining biodiversity will define our long-term success. *Plant Diversity*. https://doi.org/10.1016/j.pld.2020.06.002

Saavedra M., M. R., Cristiano, C. H., & Francisco, F. G. (2018). Sustainable and renewable energy supply chain: A system dynamics overview. *Renewable and Sustainable Energy Reviews*, *82*(March 2017), 247–259. https://doi.org/10.1016/j.rser.2017.09.033

Scheyvens, R., & Scheyvens, R. (2015). Ecotourism and the Empowerment of Local Communities Ecotourism and the empowerment of local communities. *Tourism Management*, *20*(APRIL 1999), 245–249. https://doi.org/10.1016/S0261-5177(98)00069-7

Secundo, G., Ndou, V., Vecchio, P. Del, & De Pascale, G. (2020). Sustainable development, intellectual capital and technology policies: A structured literature review and future research agenda. *Technological Forecasting and Social Change*, *153*(March 2019), 119917. https://doi.org/10.1016/j.techfore.2020.119917

Serge Kubanza, N., & Simatele, M. D. (2020). Sustainable solid waste management in developing countries: a study of institutional strengthening for solid waste management in Johannesburg, South Africa. *Journal of Environmental Planning and Management*, *63*(2), 175–188. https://doi.org/10.1080/09640568.2019.1576510

Siakwah, P., Musavengane, R., & Leonard, L. (2019). Tourism Governance and Attainment of the Sustainable Development Goals in Africa. *Tourism Planning and Development*, *0*(0), 1–29. https://doi.org/10.1080/21568316.2019.1600160

Sjaifuddin, S. (2018). Environmental management prospects of industrial area: a case study on Mcie, Indonesia. *Business: Theory and Practice*, *19*, 208–216. https://doi.org/10.3846/btp.2018.21

Sjaifuddin, S., Hidayat, S., Fathurrohman, M., Ardie, R., El Islami, R.A.Z. (2019). The development of food security behavior model through environmental-based learning: a system dynamics approach. *Jurnal Pendidikan IPA Indonesia*, 8(2), 230-240, https://doi.org/10.15294/jpii.v8i2.18861.

Sjaifuddin, S. (2020). Environmental management of industrial estate based on eco-industrial parks: A system dynamics modeling. *Industrial Engineering and Management Systems*, *19*(1), 211–227. https://doi.org/10.7232/iems.2020.19.1.211

Slootweg, R. (2005). Biodiversity assessment framework: Making biodiversity part of corporate social responsibility. *Impact Assessment and Project Appraisal*, *23*(1), 37–46. https://doi.org/10.3152/147154605781765742

Southgate, C. R. J. (2006). Ecotourism in Kenya: The vulnerability of communities. *Journal of Ecotourism*, *5*(1–2), 80–96. https://doi.org/10.1080/14724040608668448

Stoler, J., Pearson, A. L., Staddon, C., Wutich, A., Mack, E., Brewis, A., Rosinger, A. Y., Adams, E., Ahmed, J. F., Alexander, M., Balogun, M., Boivin, M., Carrillo, G., Chapman, K., Cole, S., Collins, S. M., Escobar-Vargas, J., Freeman, M., Asiki, G., … Zinab, H. (2020). Cash water expenditures are associated with household water insecurity, food insecurity, and perceived stress in study sites across 20 low- and middle-income countries. *Science of the Total Environment*, *716*(November), 135881. https://doi.org/10.1016/j.scitotenv.2019.135881

Sukholthaman, P., & Sharp, A. (2016). A system dynamics model to evaluate effects of source separation of municipal solid waste management: A case of Bangkok, Thailand. *Waste Management*, *52*, 50–61. https://doi.org/10.1016/j.wasman.2016.03.026
Sun, Y., Wendi, D., Eon, D., & Liong, S. (2016). Development and Application of an Integrated Hydrological Model for Singapore Freshwater Swamp Forest. *Procedia Engineering*, *154*, 1002–1009. https://doi.org/10.1016/j.proeng.2016.07.589

Suwarno, A., van Noordwijk, M., Weikard, H. P., & Suyamto, D. (2018). Indonesia's forest conversion moratorium assessed with an agent-based model of Land-Use Change and Ecosystem Services (LUCES). *Mitigation and Adaptation Strategies for Global Change*, *23*(2), 211–229. https://doi.org/10.1007/s11027-016-9721-0

Tan, W. J., Yang, C. F., Château, P. A., Lee, M. T., & Chang, Y. C. (2018). Integrated coastal-zone management for sustainable tourism using a decision support system based on system dynamics: A case study of Cijin, Kaohsiung, Taiwan. *Ocean and Coastal Management*, *153*(December 2017), 131–139. https://doi.org/10.1016/j.ocecoaman.2017.12.012

Teng, J., Xu, C., Wang, W., & Wu, X. (2018). *A system dynamics - based decision - making tool and strategy optimization simulation of green building development in China*. 1259–1270.

The International Ecotourism Society (TIES, 2015) Available at https://ecotourism.org/. Accessed 29 February 2020.

Tisdell, C., & Wilson, C. (2005). Perceived impacts of ecotourism on environmental learning and conservation: Turtle watching as a case study. *Environment, Development and Sustainability*, *7*(3), 291–302. https://doi.org/10.1007/s10668-004-7619-6

Torabi, Z. A., Rezvani, M. R., & Badri, S. A. (2019). Pro-poor tourism in Iran: the case of three selected villages in Shahrud. *Anatolia*, *30*(3), 368–378. https://doi.org/10.1080/13032917.2019.1595689

United Nations World Tourism Organization (UNWTO), 2020. World Tourism Barometer, 18(1). Available at https://webunwto.s3.eu-west-1.amazonaws.com/s3fs-public/2020-01/UNWTO_Barom20_01_January_excerpt_0.pdf . Accessed 31 January 2020.

van Der Kaars, S., Penny, D., Tibby, J., Fluin, J., Dam, R. A. C., & Suparan, P. (2001). Late quaternary palaeoecology, palynology and palaeolimnology of a tropical lowland swamp: Rawa Danau, West-Java, Indonesia. *Palaeogeography, Palaeoclimatology, Palaeoecology*, *171*(3–4), 185–212. https://doi.org/10.1016/S0031-0182(01)00245-0

van der Waal, J. W. H., & Thijssens, T. (2020). Corporate involvement in Sustainable Development Goals: Exploring the territory. *Journal of Cleaner Production*, *252*, 119625. https://doi.org/10.1016/j.jclepro.2019.119625

Walrave, B., & Raven, R. (2016). Modelling the dynamics of technological innovation systems. *Research Policy*, *45*(9), 1833–1844. https://doi.org/10.1016/j.respol.2016.05.011

Wit, M. De, Heun, M., & Crookes, D. (2018). *An overview of salient factors , relationships and values to support integrated energy-economic system dynamics modelling*. *29*(4), 27–36.

Wondirad, A., Tolkach, D., & King, B. (2020). Stakeholder collaboration as a major factor for sustainable ecotourism development in developing countries. *Tourism Management*, *78*(October 2019), 104024. https://doi.org/10.1016/j.tourman.2019.104024

World Travel & Tourism Council (WTTC), 2020. Available at https://www.wttc.org/. Accessed 06 February 2020.

Xu, H., & Dai, S. (2012). A system dynamics approach to explore sustainable policies for Xidi, the world heritage village. *Current Issues in Tourism*, *15*(5), 441–459. https://doi.org/10.1080/13683500.2011.610499

You, S., Kim, M., Lee, J., & Chon, J. (2018). Coastal landscape planning for improving the value of ecosystem services in coastal areas: Using system dynamics model. *Environmental Pollution*, *242*, 2040–2050. https://doi.org/10.1016/j.envpol.2018.06.082

Yu, H., Dong, S., & Li, F. (2019). *A System Dynamics Approach to Eco-Industry System Effects and Trends*. *28*(3), 1469–1482. https://doi.org/10.15244/pjoes/89508

Yu, Y., Shen, W., Yin, Y., Zhang, J., Cai, Z., & Zhong, W. (2012). Response of soil microbial diversity to land-use conversion of natural forests to plantations in a subtropical mountainous area of southern china. *Soil Science and Plant Nutrition*, *58*(4), 450–461. https://doi.org/10.1080/00380768.2012.708645

Zapata, S., Castaneda, M., Franco, C. J., & Dyner, I. (2019). Clean and secure power supply: A system dynamics based appraisal. *Energy Policy*, *131*(April), 9–21. https://doi.org/10.1016/j.enpol.2019.04.028

Zorpas, A. A., Voukkali, I., & Loizia, P. (2015). The impact of tourist sector in the waste management plans. *Desalination and Water Treatment*, *56*(5), 1141–1149. https://doi.org/10.1080/19443994.2014.934721

Sjaifuddin SJAIFUDDIN is an Associate Professor of Environmental Science at the Department of Science Education, Universitas Sultan Ageng Tirtayasa, Serang Banten, Indonesia. His current research focuses on the environmental policy and management.
ORCID ID: 0000-0003-4493-5003

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

DETERMINANTS OF HOTEL EMPLOYEES' ELECTRICITY SAVING INTENTION: EXTENDING THE THEORY OF PLANNED BEHAVIOUR[*]

Olawale Fatoki

Department of Business Management, University of Limpopo, Private Bag X1314, Sovenga, 0727, South Africa

Email: olawale.fatoki@ul.ac.za

Abstract. The hospitality industry including hotels makes a significant contribution to job creation and the gross domestic product of many countries. However, the negative environmental effects of hotels include high electricity consumption and emission of green house gases. Employees can help to improve workplace pro-environmental behaviour but the determinants of their electricity saving behaviour has not received thorough empirical investigation. Grounded on on the theory of planned behaviour (TPB), the study examined the determinants of hotel employees' electricity saving intention (ESI). The study extended the TPB by adding two constructs (environmental concern and organisational climate) to the three TPB constructs. Data was collected through the cross-sectional survey method and the Partial Least Square Structural Equation Modelling was used for data analysis. The results showed significant positive relationships between two TPB constructs (attitude and perceived behavioral control) and hotel employees' ESI. In addition, the effects of the two added constructs are significant. Theoretically, the study extended the TPB by adding two constructs and linking them to employees' ESI in the hospitality industry. Recommendations include workplace training on electricity saving.

Keywords: Electricity saving intention; theory of planned behavior; environmental concern; organisational climate; hotels; South Africa

---

1. Introduction

Environmental sustainability has emerged as a vital component of human and business survival. Human needs for natural resources have doubled in the past fifty years with negative environmental impact. Environmental risks continue to be in the forefront of the results of the annual Global Risks Perception Survey (GRPS) and in 2018 accounted for three of the five major risks by likelihood and four by impact (Bahadure, 2017; World Economic Forum, 2018). In South Arica, electricity generation increased by 2.2% between July 2017 and July 2018 and electricity consumption increased by 1.2% within the same period (Statistics South Africa, 2018; International Energy Agency, 2019). Carbon emissions associated with energy production especially from fossil fuels and consumption are a major part of total emissions and an important driver of global climate change (Zierler, 2017; Tvaronavičienė and Ślusarczyk, 2019). The speed of diversity loss has accelerated and the abundance of species has declined by about 60% since 1970 with negative impact on health and social-economic development (Norton *et al*. 2015; Khan and Chang, 2018). In addition, energy prices have increased in South Africa and around the world and global energy supplies have become less stable. In South Africa, it is anticipated that the price of electricity will rise by 9.41% in 2019/20 and this is expected to double the expected inflation rate of 4.5% (Akpan and Akpan, 2012; Tang *et al*. 2019; National Energy Regulator of South Africa, 2019). Also, public concern about environmental issues has increased and this has stimulated eco-friendly products and services. Green consumption is on the increase as many customers are aware of the effect of their buying decisions on the environment (Chen and Tung, 2014; Verma and Chandra, 2017). Due to external pressure from customers and government and the increase in the cost of electricity, many firms have started to introduce energy saving measures. The participation of employees is crucial for the success of a company's energy saving activities. Energy saving behaviour can be described as the reduction of energy use by individuals. Electricity saving intention can be described as the self-commitment of an individual to participate in electricity saving behaviours. Reducing energy use through conservation is one of the more cost effective ways to significantly decrease greenhouse gas emissions. Electricity saving is a pro-environmental behaviour (Pollard, 2015; Sony and Mekoth, 2018; Ru *et al*. 2018).

Hotels are energy intensive facilities, with high energy costs. The consumption of energy by hotels is higher than other commercial buildings. Energy costs account for 3-6% of overall operating costs of hotels. Hotels are associated with high energy wastage and low energy efficiency with 42% of the energy used to heat and cool spaces in hotels wasted. However, rising energy costs, attention of guests to sustainability and the rise of green movement in the hotel industry have increased the focus of hotels on energy management initiatives (Mensah and Blankson, 2013; Prud'homme, and Raymond, 2016; Cingoski and Petrevska, 2018).

The theory of planned behaviour (TPB) is the most frequently used theory to predict pro-environmental intentions and behaviours (Pollard, 2015; Ru *et al*. 2018). The TPB by Ajzen (1991) posits that intention positively affects actual behaviour and behavioral intention is influenced by three factors namely attitude, subjective norms and perceived behavioural control. Chen and Tung (2014) argue that despite the broad effectiveness of the TPB in explaining pro-environmental behaviour, many studies have enriched the explanatory effect of the theory by adding other constructs. This study extends the TPB by adding two new constructs (environmental concern and organisational climate) to develop a model of electricity saving purchase intention for hotel employees. Researchers on sustainability issues and pro-environmental behaviour should develop a multidisciplinary viewpoint that includes both micro and macro factors (Joshi and Rahman 2015; Sobiegalla *et al*. 2018; Sarma *et al*. 2019).

The study aims to examine the effect of these five variables on hotel employees' electricity saving intention (ESI). The study will contribute to knowledge in the following ways. First, the electricity saving behaviour of individuals has become an emerging area of research. However, extant research at the individual level has focused

on households rather than the workplace (Gao *et al*. 2017; Chang *et al*. 2018). Furthermore, while individuals need to pay for electricity consumption in households, electricity consumption in the workplace is almost free of charge to the employee. This makes electricity more easily wasted in workplaces compared to households (Gao *et al*.2017; Wesselink *et al*. 2017). Second, there is a research gap with respect to employees' electricity saving intention and behaviour in organisations and studies that have used the extended TPB to examine hotel employees' electricity saving intention in South Africa are scarce.

2. Literature review

2.1 Electricity saving behaviours
Electricity saving behaviour can be described as the behaviours performed by individuals to reduce overall electricity use and can be broadly divided into two categories. (1) Habitual energy-saving behaviours: These focus on continuous efforts to reduce electricity use by curtailment measures. Examples of habitual electricity saving behaviours include reducing or avoiding the usage of air-conditioners and turning the power off when appliances are not used (2) one-shot purchasing behaviours: This involves the replacement of old technology with high electricity use with new technology with low energy use and the purchase of more-efficient technology.

2.2 Theory of planned behaviour and electricity saving intention (ESI)
ESI can be described as the self-commitment of an individual to participate in electricity saving behaviours. The TPB is the most commonly used theory to predict pro-environmental behaviour (Pollard, 2015; Ru *et al.*, 2018). The TPB by Ajzen (1991) contends that intention predicts actual behaviour and intention is influenced by attitude, subjective norms and perceived behavioural control. In addition, other variables can be included in the TPB as long that they can be shown to improve the explanatory power of the model and are reasonable to explain a range of behaviour (Ajzen, 1991; Tommasetti *et al*.2018). Two additional constructs (environmental concern and organisational climate) are added as predictors of employees' ESI.

2.2.1 Attitude and electricity saving intention
Attitude towards the behaviour determines the extent to which a person has a favourable or an unfavourable assessment of a certain behaviour. A more favorable attitude towards a certain behavior by an individual should lead to a stronger intention to perform the behavior (Lin *et al*. 2015). Empirical literature is not conclusive about the effect of attitude on pro-environmental behaviour of individuals. Ha and Janda (2014) show that the attitude towards a green product has a strong effect on intention. Greaves *et al.* (2013) find that attitude has a significant positive relationship with the intention to engage in pro-environmental behaviour. The findings of the study by Wells *et al*. (2016) reveal that attitude has a positive effect on environmental behaviour both at home and in the workplace. Wang *et al*. (2014) show that environmental attitudes significantly influence energy-saving behavior. However, studies such as Kaiser *et al*. (1999), Park and Yang (2012) report a weak relationship between environmental attitude and environmental behaviour. If an individual considers electricity saving behaviour in the workplace as beneficial, he/she will hold a positive attitude and this can influence the intention to save electricity (Gao et *al*. 2017; Ru *et al*. 2018). Therefore, a more favorable environmental attitude by an individual should lead to a stronger intention to engage in electricity saving behaviour. Consequently, it is hypothesised that (H1): attitude towards energy saving positively affects employees' ESI.

2.2.2 Subjective norms (SNs) and energy saving intention
SNs indicate the possibility that individuals or groups that are important to an individual will like or dislike the performance of a particular behaviour (Ajzen, 1991). Greaves et al. (2013) find that SNs positively affect employees' intention to switch off computers when leaving their desk for more than one hour and recycle waste at work. The results of the study by Wang *et al*. (2014) show that SNs significantly affect the energy saving intention of city residents. Zierler (2017) argues that the relationship between SNs and intentions and behaviours

is a subject of much debate with varying empirical findings and Armitage and Conner (2001) remark that SNs tend to vary considerably across behaviours. Abrahamse and Steg (2011) find that SNs do not contribute to the explanation of intentions when attitudes and perceived behavioural control are controlled for. However, the opinions of a person or group of importance to an individual may influence the intention of that individual to engage in electricity saving as an employee in the workplace. It is hypothesised that (H2): SNs positively affect employees' ESI.

2.2.3 Perceived behavioural control (PBC) and electricity saving intention
PBC can be described as the perceived difficulty or ease of conducting a behaviour (Ajzen, 1991). There is a significant positive relationship between PBC and intention to use energy savings devices (Pollard (2015; Lin *et al*. 2015). However, Park and Yang (2012) and Kranz and Picot (2012) did not find a significant association between PBC and consumers' intention to adopt smart metering technology. The availability of resources and skill about electricity saving should positively influence behavioural intention. It is hypothesised that (H3): PBC positively affects employees' ESI.

2.2.4 Organizational electricity saving climate (OESC) and electricity saving intention
Organisational climate is a construct that has major implications for understanding human behaviour in organisations. Organisational climate can be described as the shared perception of employees about their work environment, particularly how policies and procedures are translated into tacit guidelines and practices. Pro-environmental organisational climate depicts the perception of employees about their organisations' pro-environmental policies, procedures, and practices (Castro and Martin, 2010; Norton *et al*. 2012). Zientara and Zamojska (2015) find that green organisational climate has a direct impact on organisational citizenship behaviour for the environment in hotels. However, Zhang, Wang and Zhou, (2014) find that OESC does not significantly affect electricity saving intention. This study argues that the positive perception of employees about the pro-environmental organisational climate of their organisation can positively impact on electricity saving intention. It is hypothesised that (H4): OESC positively affects employees' ESI.

2.2.5 Environmental concern (EC) and electricity saving intention
Dunlap and Jones (2002, p 484) define EC as "the degree to which people are aware of environmental problems and support efforts to solve them and/or indicate a willingness to contribute personally to their solution". Li *et al*. (2019) find that EC is significantly positively correlated with the willingness to purchase energy-efficient appliances. EC positively affects people's intention to use a park-and-ride facility (De Groot and Steg, 2007) and consumers' intention to adopt hybrid electric vehicles (Wang *et al*. 2016). EC has a significant positive effect on environmental knowledge, behavioral intention and environmentally friendly behaviour ((Pagiaslis and Krontalis, 2014; Newton *et al*. 2015). It is hypothesised that (H5): EC positively affects employees' ESI.

3. Research methodology

The study followed the quantitative research method and the data was collected through the cross-sectional survey method from participants in the Gauteng Province of South Africa. Participating hotels were conveniently selected from the website of the Tourism Grading Council of South Africa and were contacted by the researcher through a formal letter that explained the purpose of the study. Self-administered questionnaires were completed by employees of the participating hotels (see Appendix). Each participant was given a month to complete the questionnaire and was reminded weekly through emails and phone calls obtained during questionnaire distribution. The researcher pre-tested the questionnaire and the results led to the removal of sensitive information such as the name of the participant or hotel to ensure anonymity. Descriptive analysis and the Partial Least Square Structural Equation Modelling were used to analyse data.

4. Results

4.1 biographical characteristics

Thirty-three out of the forty-two hotels contacted particiopated in the survey. 660 (20 per hotel) questionnaires were distributed to the participants and 342 questionnaires were returned.

Table 1. Biographical information of the respondents.

Biographical Characteristics	Frequency ($N = 342$)
Educational qualification	
Matric	161
Post–Matric qualifications	181
Gender	
Female	163
Male	179
Age (years)	
20 years and less	0
21–30	128
31–40	157
41–50	52
Above 50	5
Work experience	
1–5	160
Above five years	182

Table 1 depicts the biographical characteristics of the survey participants. The results indicated that the majority of the respondents are males, in the 31-40 age bracket and with more than five years work experience.

4.2 Descriptive statistics

Table 2. Descriptive statistics

Construct	Mean	Standard deviation (SD)
Attitude	3.85	1.07
SNs	3.15	1.01
PBC	4.02	1.02
EC	4.05	0.99
OESC	3.90	1.01
ESI	4.40	1.06

The results of the descriptive analysis are presented in table 2. Attitude has a mean score of 3.85 with SD of 1.07. The mean score of SNs is 3.15 with a SD of 1.01. The mean score for PBC is 4.02 with a SD of 1.02. The mean score of ECis 4.05 with a SD of 0.99 and the mean score of OESC is 3.90 with a SD of 1.01. The mean score of ESI is 4.40 with a SD of 1.05.

3.3 Structural equation modelling

3.3.1 Measurement model

Table 3. Convergent validity

Construct	Measurement items	Loading	Cronbach's alpha	Composite reliability	AVE
Attitude (A)	A1	0.84	0.79	0.89	0.70
	A2	0.84			
	A3	0.79			
	A4	0.83			
Subjective norms (SNs)	SNs1	0.88	0.72	0.83	0.66
	SNs2	0.81			
	SNs 3 deleted	0.41			
Perceived behavioral control (PBC)	PBC1	0.84	0.84	0.86	0.69
	PBC2	0.76			
	PBC2	0.80			
Environmental concern (EC)	EC1	0.84	0.77	0.88	0.64
	EC2 deleted	0.49			
	EC3	0.78			
	EC4	0.76			
	EC5	0.83			
	EC6	0.80			
	EC7	0.84			
	EC8	0.86			
Organisational Energy Saving climate (OESC)	OESC1	0.78	0.75	0.91	0.67
	OESC2	0.81			
	OESC3				
Energy saving intention (ESI)	ESI1	0.82	0.81	0.87	0.64
	ESI2	0.78			
	ESI3	0.80			

Table 4. Discriminant validity

Construct	ESI	A	SN	PBC	EC	OESC
ESI	**0.80**					
A	0.79	**0.84**				
SN	0.73	0.77	**0.85**			
PBC	0.64	0.61	0.72	**0.82**		
EC	0.79	0.68	0.72	0.75	**0.82**	
OESC	0.68	0.62	0.71	0.69	0.71	**0.79**

Diagonals in bold represent the square roots of AVEs

Table 3 and table 4 depict the discriminant and the convergent validity. Four constructs (attitude, perceived behavioural control, organisational climate and energy saving intention) have all items greater than 0.708. However subjective norm and environmental concern have one item each with loading below 0.708. The two items were deleted. The results also indicate that the composite reliability is between 0.70 and 0.95, Cronbach's

alpha values for the constructs are above 0.70 and the the square roots of AVEs are higher than the correlations among the latent variables ((Hair *et al*. 2019).

3.3.2 Structural model assessment

Following the suggestions by Hair et al. (2019), the likelihood of common method bias (CMB) was examined. The VIFs for the constructs of the study were lower than 3.3 suggesting that the model is not constrained by CMB (Henseler *et al.,* 2015). The R^2 obtained by the study is 0.521 indicates a high level of predictive accuracy of the model. The original TPB model accounted for 44.9% of the variance. This indicates that inclusion of environmental concern and organisational energy saving climate increased the explained variance by 7.2%. The value of the goodness of fit (GIF) is 0.59 suggesting a good model fit and the (Q^2) using the cross validated communality is 0.56 which supports a predictive model. The effect size, f^2, ranged from 0.01 to 0.12 indicating small to medium effect sizes and the standardised root mean square residual of 0.03 is indicative of a good model fit. The results of the path coefficients and T-statistics using the bootstrapping technique are depicted in table 5.

Table 5. Path coefficient and T-statistics

Hypothesised path	Standardised Beta	T-statistics	Decision
H1 A to ESI	0.307	6.244*	Accepted
H2 SNs to ESI	0.108	0.559	Rejected
H3 PBC to ESI	0.263	6.852*	Accepted
H4 EC to ECI	0.225	3.775*	Accepted
H5 OESC to ECI	0.173	3.284**	Accepted

*P<0.01; ** <0.05

The results H1 (β =0.307, T= 6.244, p<.001). H3 (β= 0.263, T= 7.216, p<.001) and H3 (β =0.263, T= 6.852, p<.001) support significant positive relationships between attitude and perceived behavioural control and electricity saving intention. Thus H1 and H3 are not rejected. The results for H2 (β =0.108, T= 0.559, p>.05) is not significant. Thus H2 is rejected. Environmental concern (β=0.225, T=3.775, p<0.01) and organisational energy saving climate climate (β =0.173, T =3.284, p<0.05) have significant positive relationships with electricity saving intention. Thus H4 and H5 are not rejected.

4   Discussion

Electricity saving behaviour can be described as the reduction of electricity use by individuals and electricity saving intention is the plan of an individual to participate in electricity saving behaviours. The TPB is the most commonly used theory to predict pro-environmental behavioural intentions including electricity saving intention. This study extends the TPB by adding two new constructs (environmental concern and organisational climate) to the three constructs of the TPB. The findings indicated that there is a significant positive relationship between attitude and PBC and ESI. H1 and H3 of the study are supported. The study did not find a significant relationship between SNs and ESI and H2 is not supported. The results also indicated significant positive relationships between two additional constructs (EC and OESC) and ESI. Therefore, H4 and H5 of the study are supported. The findings of this is supported by both theoretical and empirical literature. The TPB shows that attitude and perceived behavioral control can predict behavioral intention. This is supported by the findings of this study. However, the effect of SNs is not significant. Pollard (2015) finds that attitude toward sustainability at work has a strong association with the use of energy savings devices. The study by Wells *et al*. (2016) revealed that attitude has a significant positive positive effect on environmental behaviour both at home and in the workplace. There is a significant positive relationship between PBC and to intention to use energy savings devices (Pollard (2015; Lin

et al. 2015). Gao *et al*. (2017) find that SNs have an insignificant effect on intention to save energy in workplaces. Organisational climate has a positive effect on hotel employees green behaviour in the workplace (Chou, 2014). Li *et al*. (2019) find that environmental concern is positively correlated with the willingness to purchase energy-efficient appliances.

5. Conclusion

This study extended the TPB by adding two new constructs (environmental concern and organisational climate) to the three constructs of the TPB. The study investigated the effect of three TPB constructs and two additional constructs on hotel employees' ESI. The findings indicate that there is a significant positive relationship between attitude and PBC and employees' ESI. The study did not find a significant relationship between SNs and ESI. The findings also indicate significant positive relationships between two additional constructs (environmental concern and organisational electricity saving climate) and ESI.

The findings of the study have some policy implications. Employees must develop a more favorable environmental attitude. Therefore, factors such as turning off lights and air conditioners when leaving the office can help to save electricity. In addition, attending workplace training on electricity saving mechanisms will be a proactive way to reduce electricity consumption. Hotels must also make available resources, knowledge and skills about electricity saving. This can be achieved by the replacement of old technology with high electricity use with new technology with low energy use. The reward of employees must take pro-environmental behaviour into consideration. To improve, organisational electricity saving climate, hotels must develop and communicate their sustainability policy to employees. The limitations of the study include the use of convinience sampling which may lead to sampling bias and the focus on 342 hotel employees in one province limits the generalisability of the findings. Other studies can examine the effect of environmental passion and workplace spirituality on employees' ESI.

References

Abrahamse, W., & Steg, L. (2011). Factors Related to Household Energy Use and Intention to Reduce It: The Role of Psychological and Socio-Demographic Variables. *Human ecology review,* 18(1), 30-40.

Akpan, G.E, & Akpan, U.F. (2012). Electricity Consumption, Carbon Emissions and Economic Growth in Nigeria. International Journal of Energy Economics and Policy, 2(4), 292-306

Ajzen, I., & Fishbein M. (1980). *Understanding Attitudes and Predicting Social Behaviour.* Englewood-Cliffs, NJ: Prentice-Hall

Ajzen, I. (1991). The theory of planned behaviour. Organizational Behaviour and Human Decision Processes, 50(2), 179–211.

Armitage, C. & Conner, M. (2001). Efficacy of the Theory of Planned Behaviour: A meta-analytic review. British Journal of Social Psychology, 40, 471-499. https://doi.org/10.1348/014466601164939

Bahadure, S. (2017). Power of Doubling: Population Growth and Resource Consumption. International Journal of Urban and Civil Engineering, 11(7), 928-935. http://doi.org/10.5281/zenodo.1131471

Banwo, A., & Du, J. (2019). Workplace pro-environmental behaviours in small and medium-sized enterprises: an employee level analysis. Journal of Global Entrepreneurship Research, 9(34), 1-20. https://doi.org/10.1186/s40497-019-0156-4

De Groot, J.I.M., & Steg L. (2007). Values, beliefs and environmental behaviour: validation of an instrument to measure egoistic, altruistic and biospheric value orientations in five countries. Journal of Cross Cultural Psychology 38, 318–332. https://doi.org/10.1177/0022022107300278

Donald, I.J, Cooper, S.R & Conchie, S.M (2014). An extended theory of planned behaviour model of the psychological factors affecting commuters' transport mode use. Journal of Environmental Psychology, 40, 39–48. https://doi.org/10.1016/j.jenvp.2014.03.003

Carrico, A., & Reimer, M. (2011). Motivating energy conservation in the workplace: An evaluation of the use of group level feedback and peer education. Journal of Environmental Psychology, (31), 113-120.

Castro, M., & Martins, N. (2010). The relationship between organisational climate and employee satisfaction in a South African information and technological organisation. South African Journal of Industrial Psychology, 36(1), 1-9. http://doi.org/ 10.4102/ sajip.v36i1.800

Chan, E., Chan, W. & Okumus, F. (2015). Barriers to Environmental Technology Adoption in Hotels. Journal of Hospitality & Tourism Research, 42(5), 829-852. https://doi.org/10.1177/1096348015614959

Chang, W, Zhang, J, Yu, P, & Hu, H. (2018). The theory of planned behaviour as a model for understanding tourists' responsible environmental behaviours: The moderating role of environmental interpretations. Journal of Cleaner Production, 194, 425-434. https://doi.org/10.1016/j.jclepro.2018.05.171

Chen, M, & Tung, P. (2014). Developing an extended Theory of Planned Behaviour model to predict consumers' intention to visit green hotels. International Journal of Hospitality Management, 36, 221-230. https://doi.org/10.1016/j.ijhm.2013.09.006

Cingoski, V., & Petrevska, B. (2018). Making hotels more energy efficient: the managerial perception. Economic Research-Ekonomska Istraživanja, 31(1), 87-101.

Dijkstra, T.K., & Henseler, J. (2015). Consistent and asymptotically normal PLS estimators for linear structural equations. Computer Statistics Data Analysis, 81, 10-23.

Dunlap, R. E., & Jones, R. E. (2002). Environmental Concern: Conceptual and Measurement Issues' In Dunlap, R. E. and W. Michelson (eds.) Handbook of Environmental Sociology, 482-524. Westport, London: Greenwood Press.

Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention, and behavior: An introduction to theory and research. Reading, MA: Addison-Wesley.

Gao, L., Wang S., Li, J., & Li, H. (2017). Application of the extended theory of planned behavior to understand individual's energy saving behaviour in workplaces. Resource Conservation and Recycling, 127, 107-113. http://dx.doi.org/10.1016/j.resconrec.2017.08.030

Greaves, M, Zibarras, L. & Stride, C. (2013). Using the theory of planned behaviour to explore environmental behavioural intentions in the workplace. Journal of Environmental Psychology (34), 109-120. http://doi.org/10.1016/j.jenvp.2013.02.003

Ha, H.-Y., & Janda, S. (2014). The effect of customized information on online purchase intentions. Internet Research, 24(4), 496-519. https://doi.org/10.1108/IntR-06-2013-0107

Hair, JF, Risher JJ, Sarsstedt, M., & Ringle CM. (2019). When to use and how to report the results of PLS-SEM. European Business Review, 31, 2-24.

Henseler, J., Ringle, C.M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modelling. Journal of the Academy of Marketing Science, 43(1), 115-135. https://doi.org/10.1007/s11747-014-0403-8

International Energy Agency (2019). Global energy demand rose by 2.3% in 2018, its fastest pace in the last decade. https://www.iea.org/newsroom/news/2019/march/global-energy-demand-rose-by-23-in-2018-its-fastest-pace-in-the-last-decade.html

Joshi, Y., & Rahman, Z. (2015). Factors affecting green purchase behaviour and future research directions. International Strategic Management Review, 3(1/2), 128-143, https://doi.org/10.1016/j.ism.2015.04.001

Kaiser, F., Wolfing, S., & Fuhrer, U. (1999). Environmental Attitude and Ecological Behaviour. Journal of Environmental Psychology (19:1), 1-19. https://doi.org/10.1006/jevp.1998.0107

Khan, MI, & Chang, YC. (2018). Environmental Challenges and Current Practices in China—A Thorough Analysis. Sustainability, 10, 1-20. http://doi.org/10.3390/su10072547

Kim, Y, & Han, H. (2010). Intention to pay conventional-hotel prices at a green hotel–a modification of the theory of planned behaviour. Journal of Sustainable Tourism, 18(8), 997-1014. https://doi.org/10.1080/09669582.2010.490300

Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. International Journal of e-Collaboration, 11(4), 1-10. http://doi.org/10.4018/ijec.2015100101

Li, G., Li, W., Jin, Z. & Wang, Z. (2019). Influence of Environmental Concern and Knowledge on Households' Willingness to Purchase Energy-Efficient Appliances: A Case Study in Shanxi, China. Sustainability, 11(4), 1073; https://doi.org/10.3390/su11041073

Lin, S Goodsite, M. & Sanderson, H. (2015). Raising Public Awareness: The Role of the Household Sector in Mitigating Climate Change. International Journal of Environmental Research and Public Health, 12, 13162-13178. 10.3390/ijerph121013162

Mensah, I. & Blankson, E.J. (2013). Determinants of hotels' environmental performance: evidence from the hotel industry in Accra, Ghana. Journal of Sustainable Tourism, 21(8), 1212-1231. https://doi.org/10.1080/09669582.2013.776058

National Energy Regulator of South Africa. (2019). Electricity production and consumption. http://www.nersa.org.za/

Newton, JD, Tsarenko, Y, Ferraro, C, & Sands, S. (2015). Environmental concern and environmental purchase intentions: The mediating role of learning strategy. Journal of Business Research, 68(9), 1974-1981. https://doi.org/10.1016/j.jbusres.2015.01.007

Norton, T. A., Zacher, H., & Ashkanasy, N. M. (2012). On the importance of pro-environmental organizational climate for employee green behavior. Industrial and Organizational Psychology: Perspectives on Science and Practice, 5, 497-500. https://doi.org/10.1111/j.1754-9434.2012.01487.x

Norton, T.A., Parker, S.L., Zacher, H., & Ashkanasy, N.M. 2015. Employee green behaviour: a theoretical framework, multilevel review, and future research agenda. Organization and Environment, 28(1), 103-125. https://doi.org/10.1177/1086026615575773

Pagiaslis A., & Krontalis A. (2014). Green consumption behaviour antecedents: environmental concern, knowledge, and beliefs. Psychology and. Marketing, 31, 335–348. https://doi.org/10.1002/mar.20698

Park, N., & Yang, A. (2012). Online environmental community members' intention to participate in environmental activities: An application of the theory of planned behavior in the Chinese Context. Computers in Human Behaviour (28), 1298-1306. 10.1016/j.chb.2012.02.013

Pollard, C.E. (2015). Applying the Theory of Planned Behavior to Computer Energy Saving Behavioral Intention and Use at Work. Twenty-first Americas Conference on Information Systems, Puerto Rico, 2015

Prud'homme, B, & Raymond, L. (2016). Implementation of sustainable development practices in the hospitality industry. International Journal of Contemporary Hospitality Management, 28(3), 609-639. 10.1108/IJCHM-12-2014-0629

Ru X, Wang S, & Yan S. (2018). Exploring the effects of normative factors and perceived behavioral control on individual's energy-saving intention: an empirical study in eastern China. Resource Conservation and Recycling, 134, 91–99. https://doi.org/10.1016/j.resconrec.2018.03.001

Sarma, U., Karnitis, G., Zuters, J., &Karnitis, E. (2019). District heating networks: enhancement of the efficiency. Insights into Regional Development, 1(3), 200-213. https://doi.org/10.9770/ird.2019.1.3(2)

Sony, M., & Mekoth, N. (2018). A qualitative study on electricity energy-saving behaviour. Management of Environmental Quality: An International Journal, 29(5), 961-977. https://doi.org/10.1108/MEQ-02-2018-0031

Statistics South Africa (2018). Electricity generated and available for distribution http://www.statssa.gov.za/publications/P4141/P4141June2018.pdf

Tang, Z, Warkentin, M, Wu, L (2019). Understanding employees' energy saving behaviour from the perspective of stimulus-organism-responses. Resources, Conservation & Recycling, 140, 216-223. https://doi.org/10.1016/j.resconrec.2018.09.030

Tommasetti, A., Singer, P, Troisi, O., & Maione, G. (2018). Extended Theory of Planned Behavior (ETPB): Investigating Customers' Perception of Restaurants' Sustainability by Testing a Structural Equation Model. Sustainability, 10, 1-21. https://doi.org/10.3390/su10072580

Tvaronavičienė, M., & Ślusarczyk, B. (2019). Energy transformation towards sustainability. *Energy transformation towards sustainability* (pp. 1-333) https://doi.org/10.1016/C2018-0-02510-4 Retrieved from www.scopus.com

Verma, V., & Chandra, B. (2017). Intention to Implement Green Hotel Practices: Evidence from Indian Hotel Industry.   International Journal of Management Practice, 11(1), 24-32. https://doi.org/10.1504/IJMP.2018.088380

Wang, Z., Zhang, B., & Li, G (2014). Determinants of energy-saving behavioural intention among residents in Beijing: Extending the theory of planned behavior. Journal of Renewable and Sustainable Energy, 6(5), 053127 https://doi.org/10.1063/1.4898363

Wang, S., Fan, J., Zhao, D., & Yang, S. (2016). Predicting consumers' intention to adopt hybrid electric vehicles: using an extended version of the theory of planned behaviour model. Transportation, 43(1), 1-21 https://doi.org/10.1007/s11116-014-9567-9

Wells, V. K., Taheri, B., Gregory-Smith, D., & Manika, D. (2016b). The role of generativity and attitudes on employees home and workplace water and energy saving behaviours. Tourism Management, 56, .63-74. http://dx.doi.org/10.1016/j.tourman.2016.03.027

Wesselink, R, Blok, V., & Ringersma, J. (2017). Pro-environmental behaviours in the workplace and the role of managers and organisation. Journal of Cleaner Production, 168, 1679-1687. 10.1016/j.jclepro.2017.08.214

World Economic Forum. (2018). Global risks report. https://www.weforum.org/reports/the-global-risks-report-2019

Yadav, R., & Pathak, G. (2016). Young consumers' intention towards buying green products in a developing nation: Extending the theory of planned behaviours. Journal of Cleaner Production, 135,732-739. https://doi.org/10.1016/j.jclepro.2016.06.120

Zhang, Y., Wei, Y., & Zhou, G. (2018). Promoting firms' energy-saving behaviours: The role of institutional pressures, top management support and financial slack. Energy Policy, 115, 230–238. https://doi.org/10.1016/j.enpol.2018.01.003

Zhang, Y., Wang, Z., & Zhou, G. (2014). Determinants of employee electricity saving: The role of social benefits, personal benefits and organizational electricity saving climate. Journal of Cleaner Production, 66, 280-287. https://doi.org/10.1016/j.jclepro.2013.10.021

Zientara, P, & Zamojska, A. (2016). Green organizational climates and employee pro-environmental behaviour in the hotel industry. Journal of Sustainable Tourism, 24(6), 1-18. https://doi.org/10.1080/09669582.2016.1206554

Zierler, R. (2017).   Energy-saving attitudes and behavioural influences in large organisations: The case of Network Rail. https://pdfs.semanticscholar.org/ff73/21263eaa95edf597cee6d8862f0d17edbe54.pdf

Appendix: Questionnaire

Concept	Survey items	Response category	Adapted from
Attitude	1. I think that saving electricity in my workplace is useful to protect the environment. 2. I think that saving electricity in my workplace is significant to reduce carbon emissions. 3. I think that saving electricity in my workplace is valuable to reduce electricity shortage. 4. I think that saving electricity in my workplace is a wise decision.	I strongly disagree, 2 disagree, 3 neutral, 4 agree, 5 strongly agree	Ajzen (1991) and Gao *et al.* (2017
Subjective norms	1. My colleagues that that I should save electricity in the workplace. 2. My managers think that I should save electricity in the workplace. 3. Other people that are important to me think that I should save electricity in the workplace.	I strongly disagree, 2 disagree, 3 neutral, 4 agree, 5 strongly agree	Ajzen (1991) and Gao *et al.* (2017
Perceived behavioral control	1. I think that I am capable of saving electricity in my workplace. 2. I have the knowledge and skill to save electricity in the workplace.	I strongly disagree, 2 disagree, 3 neutral, 4 agree, 5 strongly agree	Ajzen (1991) and Gao *et al.* (2017

	3. Whether or not I save electricity is completely up to me.		
Environmental concern	1. I am extremely worried about the state of the world's environment and what it means for the future 2. Mankind is severely abusing the environment 3. When mankind interferes with nature, it often produces disastrous consequences 4. The balance of nature is delicate and easily upset 5. Human must live in harmony with nature in order to survive 6. I think that environmental problems are important 7. I think that environmental problems cannot be 8. I think that we should care about environmental problems.	I strongly disagree, 2 disagree, 3 neutral, 4 agree, 5 strongly agree	Chen and Tung, 2014 and Yadav and Pathak (2015)
Organisational electricity saving climate	1. Electricity saving is encouraged in my workplace 2. My workplace puts value on electricity saving 3. My workplace is actively committed to electricity saving.	I strongly disagree, 2 disagree, 3 neutral, 4 agree, 5 strongly agree	Zhang *et al.* (2014)
Electricity saving intention	1. I am willing to save electricity in my workplace. 2. I intend to engage in electricity saving activities in my workplace 3. I plan to save electricity in my workplace	I strongly disagree, 2 disagree, 3 neutral, 4 agree, 5 strongly agree	Ajzen (1991), Chen and Tung (2014) and Zhang *et al.* (2014)

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Publisher
http://jssidoi.org/esc/home

MARKET FOR MEMRISTORS AND DATA MINING MEMORY STRUCTURES FOR PROMISING SMART SYSTEMS *

Andrey I. Vlasov [1], Ivan V. Gudoshnikov [2], Vladimir P. Zhalnin [3], Aksultan T. Kadyr [4], Vadim A. Shakhnov [5]

[1,2,3,4.5] Bauman Moscow State Technical University, 5 Vtoraya Baumanskaj Str., Moscow, 105005, Russian Federation

E-mails:[1]vlasov@iu4.ru ; [2]ivanmostwanted@mail.ru ; [3]zhalnin@mail.ru ; [4]aksultank@gmail.com ; [5]shakhnov@bmstu.ru

Abstract. The article examines the market for promising memristor-based memories for smart systems. The implementation of smart systems is characterized by the widespread use cyber-physical systems, predictive maintenance, AR/VR (Augmented/Virtual Reality) technologies, the Internet of Things (IoT), and Machine Learning algorithms. To stimulate their development, an increasing amount of computational resources and new data storage technologies is required. The current study aims to analyze the development of today's memristive technologies market in the context of their influence on the development of smart systems. The authors discuss the key stages of the market's formation and assess the possible effect of memristive technology on various spheres of society's life. The research results show that the application of memristive technology can affect the development dynamics of both data mining and promising data storage systems. The estimates obtained demonstrate that the memristor market is highly competitive and there are a considerable number of active participants operating on it. The majority of companies expand their market presence by entering various end-user segments. The annual market growth rate will average about 80% and reach an estimate of USD 8.9 billion by 2024 and USD 13.5 billion by 2027.

1. Introduction

The rapid development of digital technology and the widespread adoption of smart systems have emphasized the key role of Big Data management. There are a number of major trends in the digital transformation of industry that are worth mentioning: autonomous robots (Yudin et al., 2017); cloud computing and storage (Che, Safran & Peng, 2013); CAD systems (modeling and simulation) (Demin &Vlasov, 2017); the Internet of Things (Berdyugina, Krivoshein & Vlasov, 2018); and augmented reality (Che, Safran & Peng, 2013). These technologies, when introduced in manufacturing, will lead to the creation of smart factories and initiate a new era in all sectors of industry, which can result in the fourth industrial revolution (The fourth…, 2017), or Industry 4.0 (Witten & Frank, 2016). For this to happen, vast computational resources and storage space are needed.

Computational resources and data storage technology are approaching their maximum capability year after year. Non-volatile CMOS-based memory has already reached its full potential. However, data volumes keep growing, so there is a need to discover a brand-new principle of data storage (Vasilyev & Chernov, 2012). Solutions in this field are characterized by the application of cyber-physical systems (Lee, 2006; Lee & Seshia, 2011), predictive maintenance (Grigoriev et al., 2018), AR/VR (Augmented/Virtual Reality) technologies (Che, Safran & Peng, 2013), the Internet of Things (IoT) (Lee, 2006; Lee & Seshia, 2011), Machine Learning algorithms (Whitaker et al., 2018), and decentralized architecture (Blockchain technology) of Big Data analysis and processing (Che, Safran & Peng, 2013; Muraviev et al., 2019). However, among other solutions, this is a memristor that is considered a promising device in numerous analog and digital applications, especially in memory chips, logic circuits, and neural networks.

The *purpose* of the paper is to analyze the development of the market for the modern component base of smart systems based on memristor technology that ensure the implementation of intelligent data processing algorithms and methods for their storage.

2. Literature review

Digital transformation involves manipulating not only technical, but also economic, social and other data that are necessary to manage digital production processes in a more effective manner (Litau, 2018a,b). A continuous increase in information volumes has led to the creation of a separate class of data, namely Big Data (Che, Safran & Peng, 2013; Muraviev et al., 2019). To process large volumes, network computing technology has to be used (Veretennikov, 2017), whereas the creation of the memristor component base is believed to be a promising solution in the field of data storage.

A memristor is a non-linear two-terminal electrical component relating electric charge and magnetic flux linkage (Jeong & Shi, 2019). There are various methods for fabricating memristors. The most popular of them are lithography (Jung, 2004), atomic layer deposition (Emelyanov et al., 2015), pulsed laser deposition (Puurunen, 2005) and sputter deposition (Wasa & Hayakawa, 1993). The technological evolution of the memristor-related component base is presented in Fig. 1. The research studies devoted to memristors are gaining in popularity. The number of international scholarly publications increased from 2 pieces in 2005 to 48 pieces in 2015. The number of international patent applications is also rising – from 40 in 2005 to 158 in 2015 (Borodina et al., 2017).
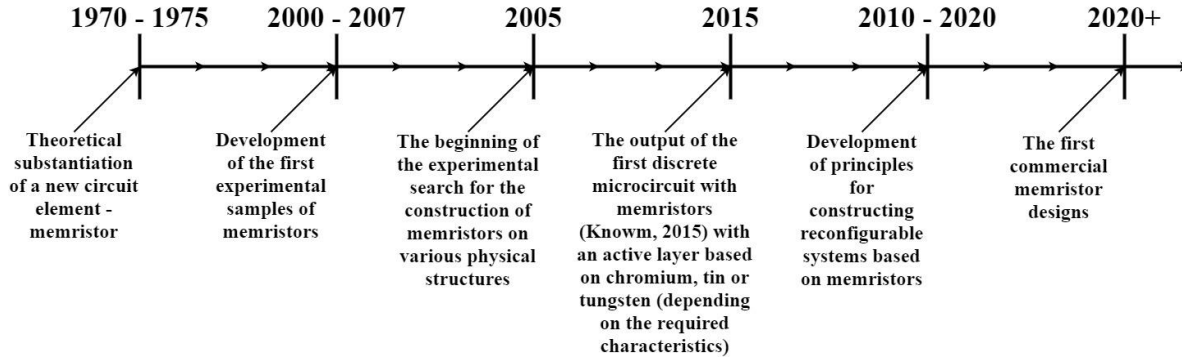
Fig. 1. Memristor Development Time line

When analyzing the development trends in memristor technologies, it is worth noting their high versatility (Ho, Huang & Li, 2009). In terms of memory chips, memristors can be applied in cell structures of resistive random-access memory (RRAM) and in memristor-based content addressable memories (MCAM) using a combination of memristor and memory cell technology, as well as in multilevel memristor memory (MLMM) (Yener & Kuntman, 2012). Due to the powerful capabilities of memristor technology, Ho and Huang (2009) suggested using these advantages for making calculations directly inside the system, eliminating the need to upload data to the cloud and thus increasing the security of such systems. Memristor-based logic has a remarkable ability that allows arranging memory cells on a single chip. Memristors can be applied in the development of switching units in field-programmable gate array (FPGA) (Sampath, Mane & Ramesha, 2015).

There are three main directions for the research of memristors: developing various types of memristors, searching for memristor manufacturing options, and dealing with the problem of manufacturing memristors (Sherief et al., 2019) (Fig. 2).
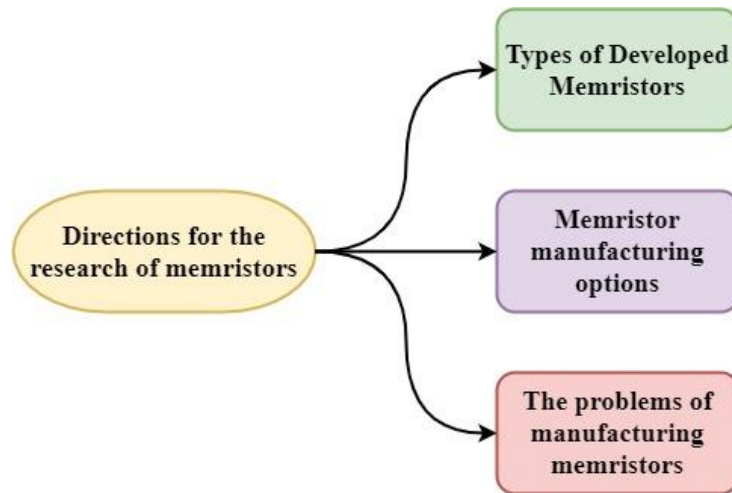
Fig. 2. Directions for the research of memristors

Currently, the memristor market's investment attractiveness is at its early stage of development as there is lack of devices ready for mass production (TMR, 2017). The formation of the memristive technology market is affected by a basic operational contradiction (Fig. 3): if a material of better quality and of higher price is used to fabricate memristors, the quality of the memory created is enhanced in terms of the number of writes and response time;

however, it causes a serious rise in production costs and makes it difficult to start mass production. The choice of a memristor material determines the "memory strength" reflected in the number of rewrite cycles and the total cost of production.
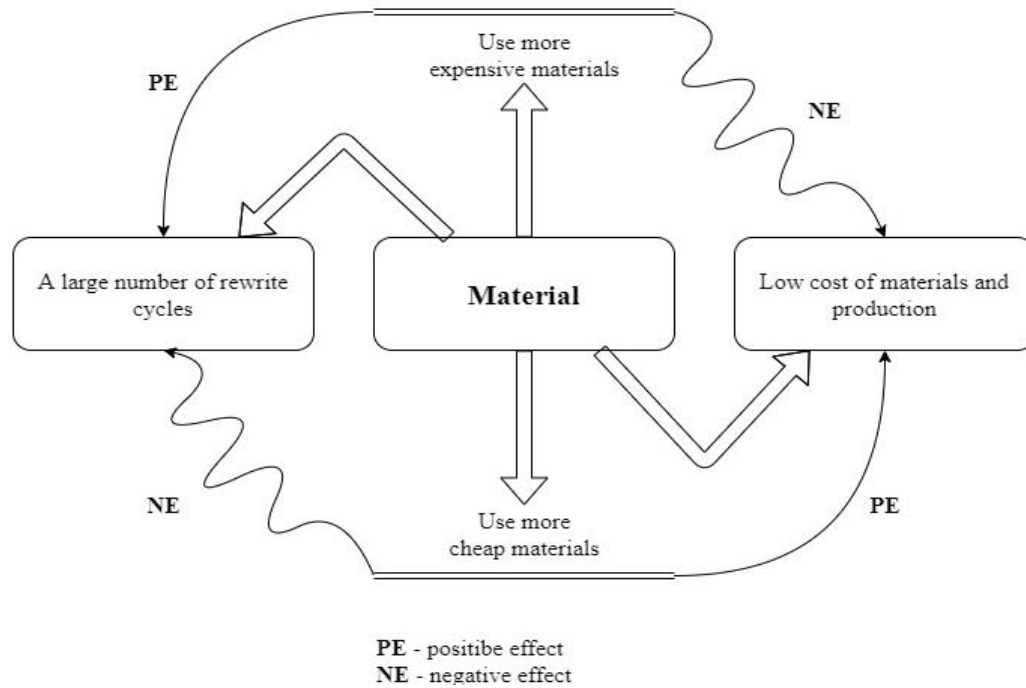
Fig. 3. Operational controversy scheme

Memory devices are increasingly becoming a bottleneck in data storage and data retrieval processes, and this limits storage performance. To improve computing speed significantly, scientists are striving to design smaller and denser memory devices that operate at high speed and consume low power (RM, 2018). With the advent of advanced technologies, data storage systems process more information than ever before. To do so, they should be of high performance, accessible, scalable, and manageable (Shukla & Sharma, 2017). The main studied parameters of memristor technologies and their influence are shown in Table 1.

Table 1. Effect of memristive technologies parameters on their properties

Parameter	Effect
Storage density	Capacity increase (Vasilyev & Chernov, 2012)
Response time	Increased data processing speed (Matkarimov, 2018)
Synaptic properties	Empowering Artificial Intelligence (Snider et al., 2011)
Power efficiency	Computing systems autonomy (Ho, Huang & Li, 2009), power capacity (MM, 2017)

The forecast properties of memristors and the current memories are compared in Table 2 (Sherief et al., 2019; TMR, 2017; RM, 2018; Shukla & Sharma, 2017).

Table 2. Memory-related memristor properties

Property	Memristor	PCM	STTRAM	DRAM	Flash	HDD
Storage density (F^2)	<4	8–16	37–64	6–8	4–6	2/3
Energy per bit (pJ)	0.1–3.0	2–27	0.1	2	10000	$1–10 \times 10^9$
Read timing (ns)	10–100	20–70	10–30	10–50	25000	$5–8 \times 10^6$
Write timing (ns)	~10	50–500	13–95	10–50	200000	$5–8 \times 10^6$
Retention	Years	Years	Weeks	<<Seconds	Years	Years
Rewrite cycle	$>10^{12}$	10^7	10^{15}	10^{15}	10^6	10^4

Based on recent studies, it can be concluded that the use of memristor technology will affect the dynamics of the development of both data mining and promising data storage systems (Vasilyev & Chernov, 2012; Vera-Tasama, Gomez-Cano & Marin-Hurtado, 2019; Marani, Gelao & Perri, 2015).

3. Methods

Designing an approach to the problem of analyzing the dynamics of the memristor market development includes the formulation of the theoretical framework of the research, analytical models, search queries, hypotheses, as well as the identification of the factors that can affect the nature of the study.

Analytical research methods are diverse (Fig. 4).
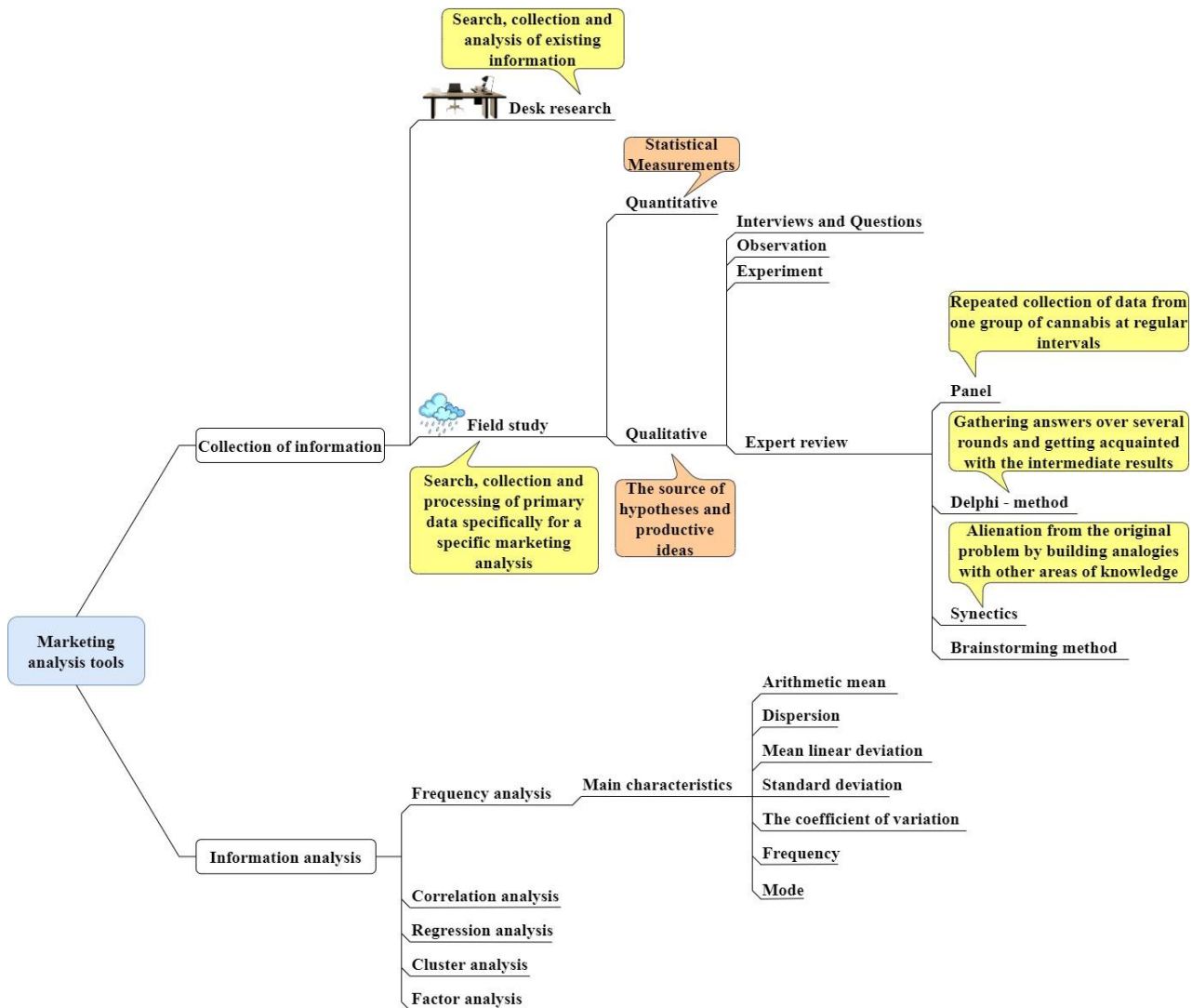
Fig. 4. System analysis methods

The expert approach, upon which the current study is built, should be discussed in more detail. Methods of expert assessments are methods of organizing work with experts and processing opinions of experts expressed in a quantitative and (or) qualitative form.

The research procedure suggests direct communication of expert opinions.

When analyzing expert assessments, a variety of statistical methods can be utilized (Table 3): consistency check (or expert classification, if no consistency is observed) and averaging expert opinions within an agreed group. It is a widespread approach to use simultaneously the mean ranks method and the median ranks method.

Table 3. Methods and algorithms for analyzing expert assessments

Method	Algorithm
Mean ranks method	Calculation of the sum of ranks assigned by experts → Dividing the amount by the number of experts → Final ranking for calculated average ranks
Median ranks method	Sort expert scores for each item in non-decreasing order → Choose a median (centrally ranked) → Final median ranking
Clustered ranking matching method	Selection of conflicting pairs of objects → Formation of clusters of the final clustered ranking → Cluster ordering

Applying the methods from Table 3, we have assessed the dynamics of the memristor market development by analyzing expert panels, as well as summarizing the data from statistical reports (MMR, 2019; MW, 2020; Kastalskiy, 2017; Berd, 2014; Pechatnick, 2010). Quantitatively the market is assessed according to basic indicators. The level of concentration of the industrial market is one of the key characteristics of its structure. Other characteristics of the market are taken into account along with concentration. The structure of the industry market is revealed by three basic indicators – the number of suppliers, the suppliers' market share, and the market concentration indicators (Kuzmin, Volkova & Fomina, 2019).

The qualitative assessment of the representativeness of the sample for identifying the dynamics of the memristor market development indicators was based on the results of several studies that concentrated on exploring the

trends in the memristor market (TMR, 2017; RM, 2018; Shukla & Sharma, 2017; MM, 2017; MI, 2020; FMI, 2016; IA, 2020; MRO, 2015; AMR, 2016; TIP, 2020). When performing the analysis, we used the data from patent systems Federal Institute of Industrial Property (www.fips.ru), United States Patent and Trademark office (www.uspto.gov), European Patent Office (www.espacenet.com), application database of the World Intellectual Property Organization (www.wipo.org), as well as scientific publication and citation databases (Web of Science, Scopus, eLIBRARY.RU).

4. Results

Key factors that navigate the growth in the global memristor market size are advantages of memristors over other memories, increase in number of industrial robots, which require larger memory, increase in demand of tablets, watches, smart phones and other smart wearable devices, whose power capacity can significantly enhance due to memristors (MMR, 2019). According to Cisco Systems' estimates, by 2022 the number of wearable devices in the world can reach 1,105 billion units as compared to 593 million units in 2018 (Fig. 5).
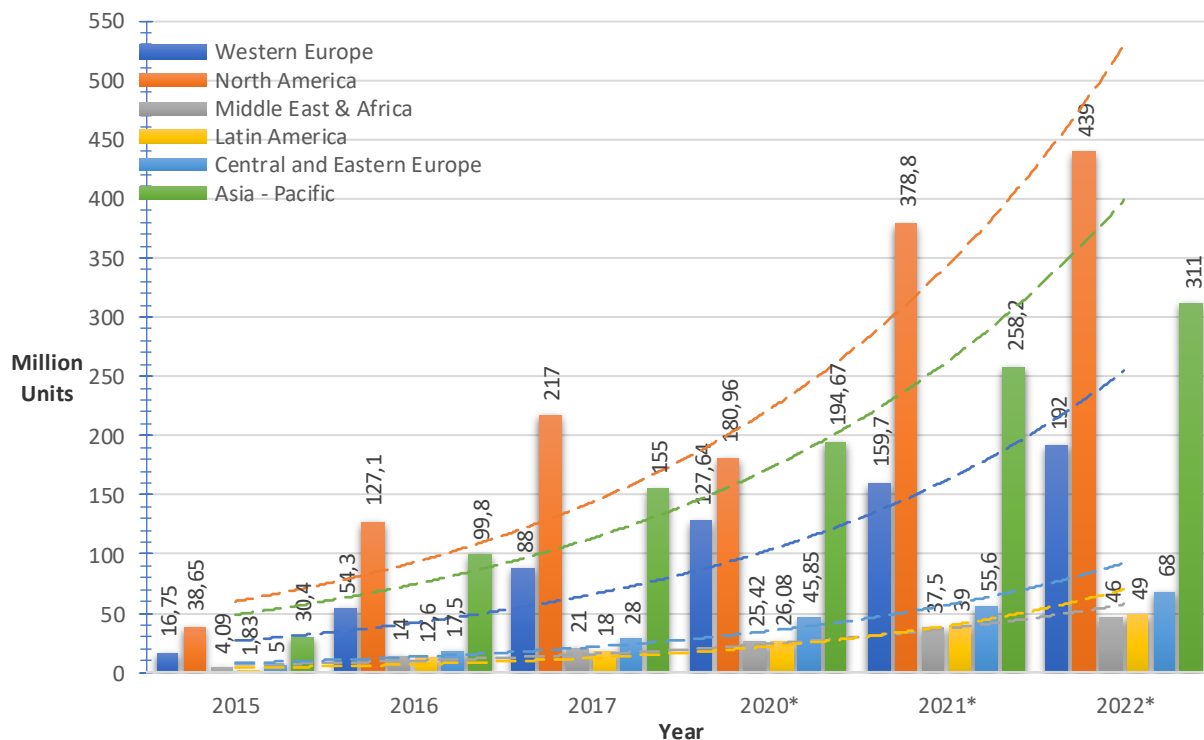
Fig. 5. The use of wearable devices with a forecast up to 2022 by region
Source: (Statista, 2020).

The growing popularity of the IoT and increasing demand for neural networks open up new opportunities for participants in the memristor technology market. In 2018, the memristors market was valued at USD 278.05 million (PRN, 2019). Estimates of the market are increasing every year. Numerous forecasts indicate that the annual market growth rate will average about 80% and reach an estimate of USD 8.9 billion by 2024 and USD 13.5 billion by 2027, and there is still more to come (MI, 2020; FMI, 2016; IA, 2020).

The interest of researchers in memristors is constantly growing. Figure 6 shows the increase in the number of publications on memristors: by 2020, their number has increased 8 times. Figure 7 illustrates an increase in the

number of memristor-related articles (according to the publication archive of Web of Science, Scopus and eLIBRARY.RU). The rise is even more significant here.
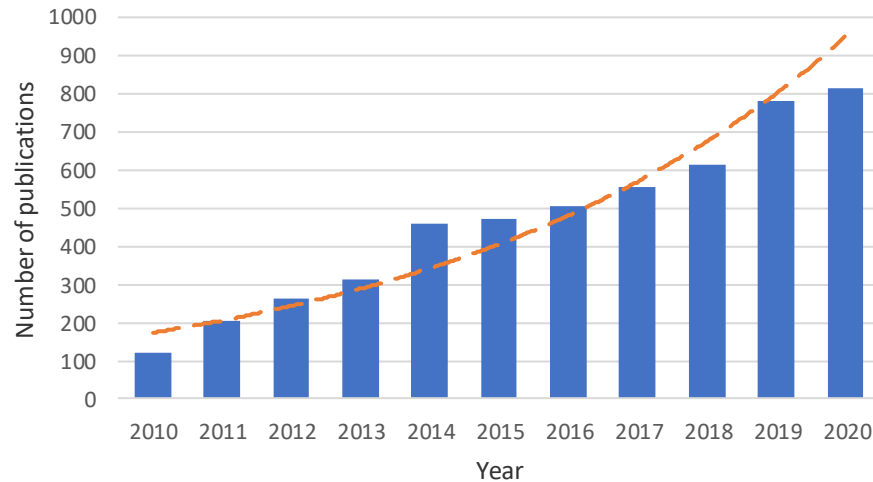
Fig. 6. The number of publications on memristor technology
Source: (Sherief et al., 2019; TMR, 2017; RM, 2018; Shukla & Sharma, 2017).
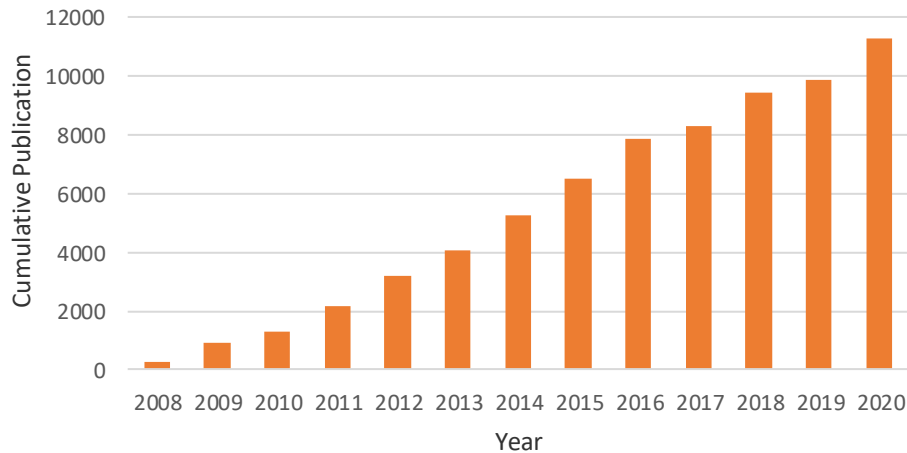
Fig. 7. Cumulative publication per year
Source: (Sherief et al., 2019; TMR, 2017; RM, 2018; Shukla & Sharma, 2017).

The memristor market is highly competitive. Figure 8 shows that the key players and investors of the market are the following: HP development company, L.P. (www.8.hp.com); Intel Corporation (www.intel.ru); Knowm Inc (knowm.org); Micron Technology, Inc. (www.micron.com); Panasonic Corporation (www.panasonic.com); Rambus Incorporated (www.rambus.com); Samsung (www.samsung.com); San Disk Corporation (www.shop.westerndigital.com/sandisk); Sk Hynix Inc. (www.skhynix.com); and Toshiba Corporation (www.toshiba.co.jp . Most companies expand their market presence by entering various end-user segments. The effectiveness of such a strategy is grounded by forceful arguments (Toomsalu et al., 2019; Chernova et al., 2019).
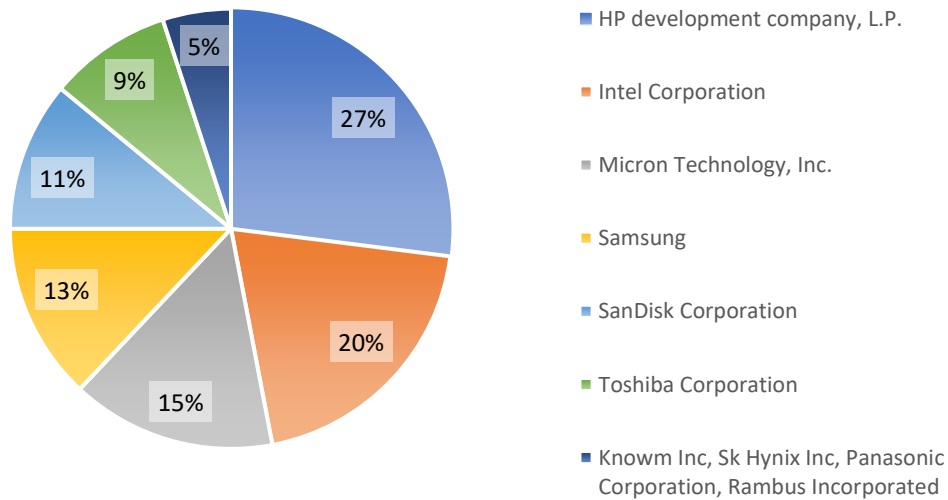
Fig. 8. Activities of global manufacturers of memristive technologies
Source: (MRO, 2015).

According to Accurize Market Research (AMR, 2016), the global memristor market is geographically categorized into North America – 33%, Europe – 27%, Asia Pacific – 24%, rest of the world – 16%. North America is one of the most significant markets for memristors (Fig. 9). This is due to the high level of investment in research and development from local market players, many of which are located in the United States (Lambert, 2020). The country is also among the key participants in most memristor applications, such as neuromorphic computing, car electronics, flexible electronics, the IoT, and industrial robotics. The region's investments in edge computing and systems on a chip (SoC) are significantly higher compared to investments from companies from other regions of the world.
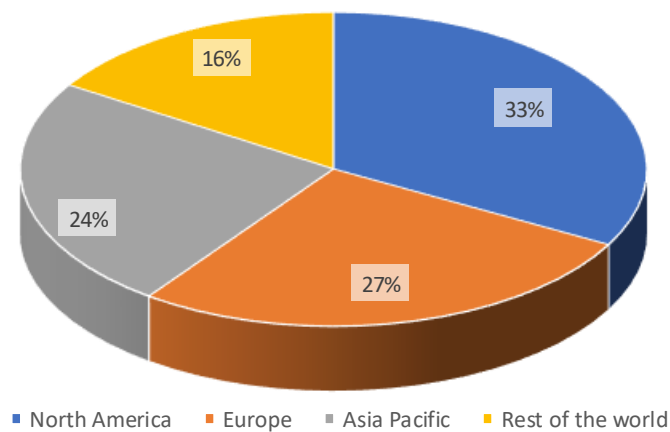
Fig. 9. The scale of the world market of memristors on a geographical basis
Source: (AMR, 2016).

107

When analyzing global trends in the development of memristive technology, it can be stated that they are passing through the second stage of development (Fig. 10). The first stage of this technology's development is over. Its major result is the discovery of the possibilities of creating memristors. At the moment, global memristor manufacturers are actively exploring the possibility of improving the current results to pass through the second stage and enter the third one.
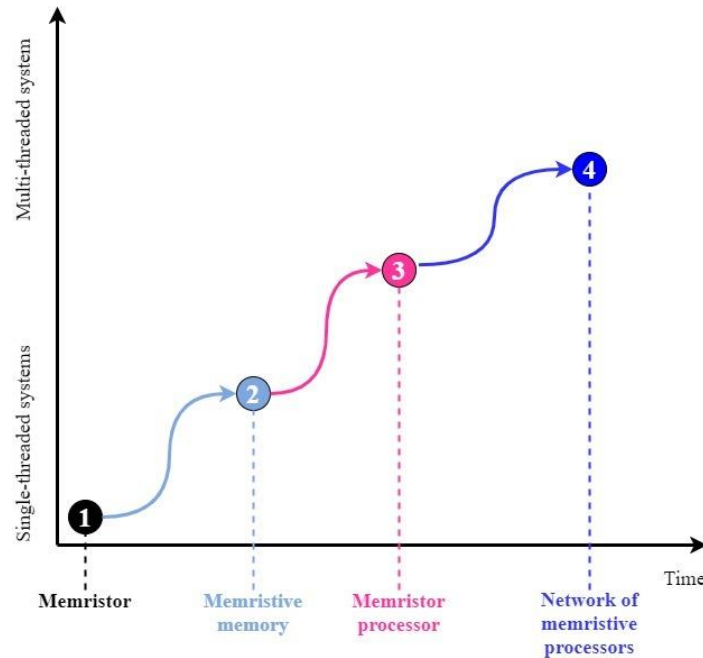
Fig. 10. The development trend of memristive technology

As with the development of processors, memristive technology will improve its capacity in the process of its further introduction and integration. In this regard, we can assert that memristors will be going through at least 4 development stages starting from single-thread systems to multi-thread ones that will take the form of a memristor processors network (Potkina & Kholopova, 2014). With the emergence of first memristor processors capable of integrating into common computing systems, memristive technology will start being introduced and applied across all countries.

However, despite all the existing inventions, the introduction of this technology can be projected for the next decade only, since there are still a vast number of unresolved technological and economic issues, in particular, the need for substantial investment in re-equipment. Based on the analysis of the current situation using the data from patent reports and publication activity (Kastalskiy, 2017; Berd, 2014; Pechatnick, 2010; Politbook, 2020), it is possible to forecast future change in the memristive technologies market (Fig. 11).
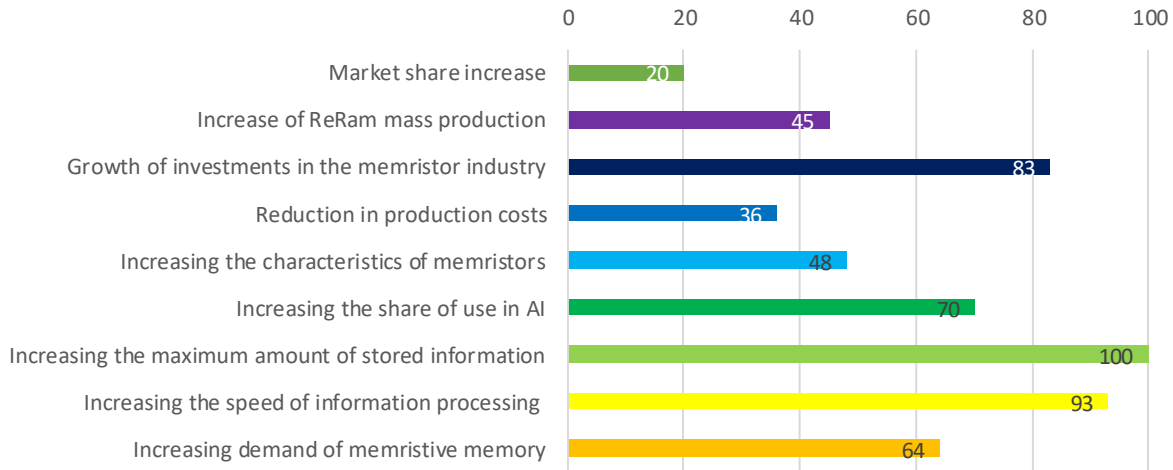
Fig. 11. Projected estimates for the implementation of memristive technologies by 2030, %

It can be assumed that the first breakthrough in memristive technology will happen in the field of data storage. A fundamentally new type of memory and its properties allow storing much larger amounts of data, while production costs are comparable to current high-budget solutions.

5. Discussion

The effect of memristive technology on the development trends in modern smart systems is presented in Fig. 12. Memristive technology is versatile. In terms of manufacturing and IT, this technology will lend powerful impetus to the development of computer technology, forecasting and automation algorithms. In the field of social technology, the introduction of memristors can significantly improve the security of personal data (Halkos & Skouloudis, 2016; Metaxas, 2016). Implementing memristor technology in medicine will generate abundant resources for scientific research in the field of vaccines and diseases. Robotics will acquire genuine artificial intelligence that can simulate human behavior without using absolute algorithms, the variability of which is limited only by positive or negative values.
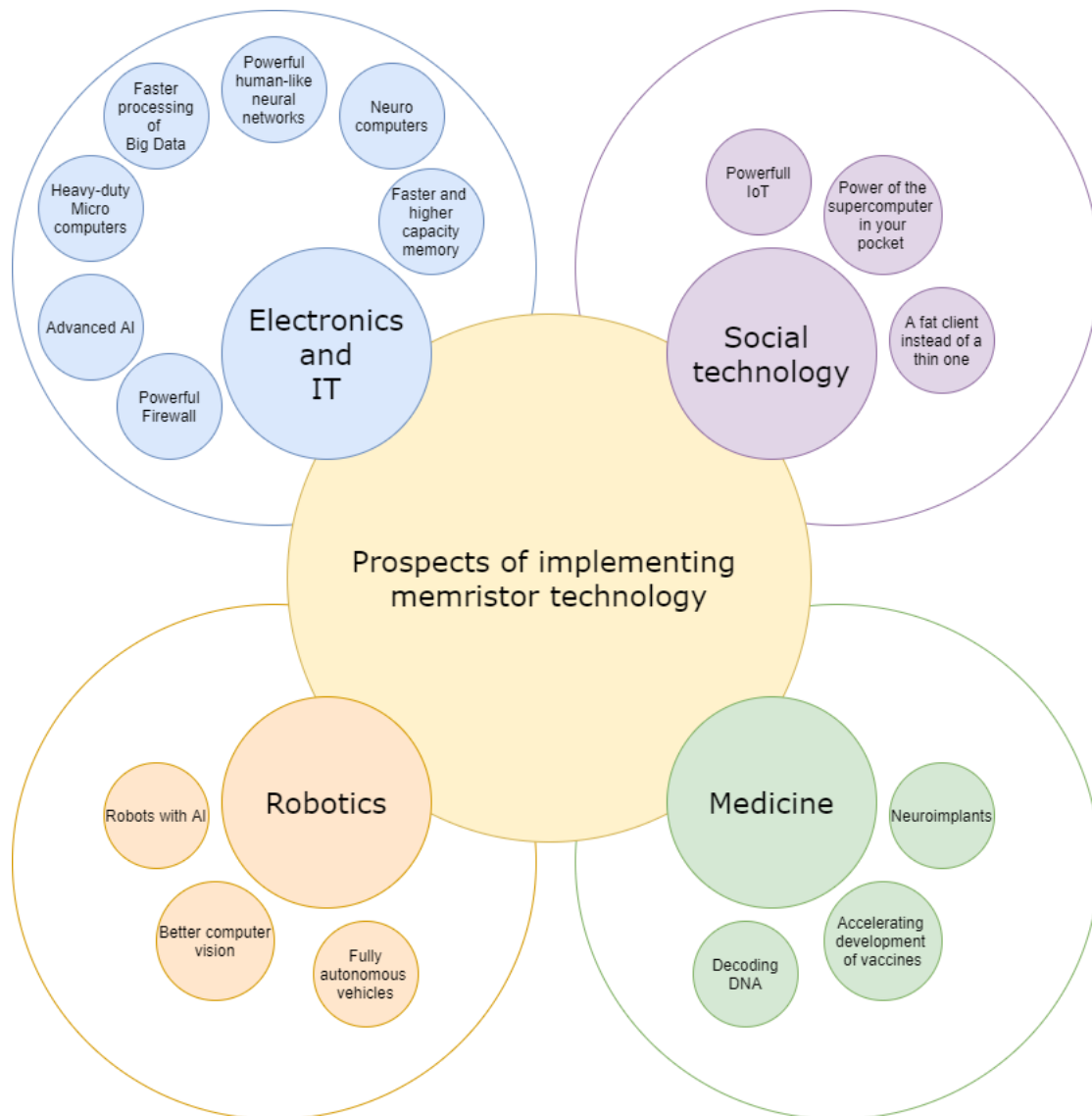
Fig. 12. Prospects of implementing memristor technology

The benefits of implementing memristive technologies, such as increased capacity and energy efficiency, will contribute to the development of Big Data. This will entail the expansion of CAD systems' capabilities while simulating the environment through creating digital twins (Vichugova, 2020).

The efficiency of the IoT is expected to rise, which will make it possible to decentralize increasingly complex mechanisms, and sensors will be able to track and transmit larger volumes of data. All devices can be synchronized within the same ecosystem and work as a single unit. Cloud storage and computing will become the crucial link between specialists in different fields, simplifying the introduction of changes and adjustments to the development and production process.

The similarity between the memristor and the synapse will make the next step forward in the field of neural networks and artificial intelligence. Neural computing productivity expanded massively will lead to even more

efficient machine learning, and computer "vision" will move far forward, which can significantly accelerate the development of robotics. Due to memristive technologies, artificial intelligence and synaptic neural networks will be able to get closer to the power, flexibility and variability of human brain. All the aspects mentioned above are a prerequisite for further development of smart systems.

Conclusions

The present paper has concentrated on the analysis of memristive technology. Having considered the available data, one can conclude that today's market of memristor-based devices is, in the first place, a market of ideas, research studies and patents. The research interest in memristors is constantly growing. Over the last decade, the number of publications on memristors has increased 8 times. The similar dynamics is observed among studies indexed in Web of Science, Scopus and eLIBRARY.RU. The obtained estimates show that the memristor market is highly competitive and is represented by a number of active players. The majority of companies expand their market presence by entering various end-user segments. The annual market growth rate will average about 80% and near USD 8.9 billion by 2024 and USD 13.5 billion by 2027. North America is among the strongest markets for memristors. This is due to significant investment in R&D from local market players, many of which are situated in the United States. However, in terms of the memristor technology implementation, it is only possible to make forecasts for the next 10 years, since many unsolved technological and economic problems still persist.

References

AMR. (2016). Memristor Market Global Scenario, Market Size, Outlook, Trend, and Forecast, 2016–2025. *Accurize Market Research*. Retrieved from https://www.accurizemarketresearch.com/report/memristor-market/.

Berd, K. (2014). *Memristors: Is it time to rewrite textbooks?* Retrieved from https://3dnews.ru/906763.

Berdyugina, O. N., Krivoshein, A. I., & Vlasov, A. I. (2018). Technological platform for innovative social infrastructure development on basis of smart machines and principles of internet of things. *Proceedings 2018 Global Smart Industry Conference (GloSIC)*. No. 8570062. https://doi.org//GloSIC.2018.8570062

Borodina, I., Korshunov, A., Milshina, J., Vishnevsky, K., Kiseleva, L., & Pushkov, V. (2017). New generation electronics. *Global Technology Trends, 07*, 1–4.

Che, D., Safran, M., & Peng, Z. (2013). From big data to big data mining: Challenges, issues, and opportunities. In B. Hong, X. Meng, L. Chen, W. Winiwarter, & W. Song (Eds.), *Database Systems for Advanced Applications*. DASFAA 2013. Lecture Notes in Computer Science, vol. 7827. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-40270-8_1

Chernova, V. Y., Starostin, V. S., Degtereva, E. A., & Andronova, V. I. (2019). Study of sector-specific innovation efforts: The case from Russian economy. *Entrepreneurship and Sustainability Issues, 7*(1), 540–552. https://doi.org/10.9770/jesi.2019.7.1(38)

Demin, A. A., & Vlasov, A. I. (2017). Visual methods of formalization of knowledge in the conditions of the synchronous technologies of system engineering. *CEE-SECR '17: Proceedings of the 13th Central & Eastern European Software Engineering Conference in Russia*. Article No.: 4. Pp. 1–7. https://doi.org/10.1145/3166094.3166098

Emelyanov, A. V., Demin, V. A., Antropov, I. M., Tselikov, G., Lavrukhina, Z. V., & Kashkarov, P. (2015). Effect of the thickness of the TiOx/TiO2 layers on their memristor properties. *Technical Physics, 60*(1), 112–115. https://doi.org/10.9770/jesi.2019.7.1(38)

FMI. (2016). Memristor Market: Global Industry Analysis and Opportunity Assessment 2016-2026. *Future Market Insights*. Retrieved from https://www.futuremarketinsights.com/reports/memristor-market.

Grigoriev, P. V., Krivoshein, A. I., Shakhnov, V. A., Filin, S. S., Migalin, V. S., Vlasov, A. I. (2018). Smart management of technologies: Predictive maintenance of industrial equipment using wireless sensor networks. *Entrepreneurship and Sustainability Issues, 6*(2), 489–502. https://doi.org/10.9770/jesi.2018.6.2(2)

Halkos, G., & Skouloudis, A. (2016). Cultural dimensions and corporate social responsibility: A cross-country analysis. *MPRA Paper 69222*, University Library of Munich, Germany.

Ho, Y., Huang, G. M., & Li, P. (2009). Nonvolatile memristor memory: Device characteristics and design implications. *Proceedings of the IEEE/ACM International Conference on Computer-Aided Design*. San Jose, California. Pp. 485–490. https://doi.org/10.1145/1687399.1687491

IA. (2020). Memristor Market – Forecast (2020–2025). *IndustryARC*. Retrieved from https://www.industryarc.com/Report/15092/memristor-market.html.

Jeong, H., & Shi, L. (2019). Memristor devices for neural networks. *Journal of Physics D: Applied Physics, 52*(2), 023003. https://doi.org/10.1088/1361-6463/aae223

Jung, G. Y. (2004). Fabrication of a 34x34 crossbar structure at 50 nm half-pitch by UV-based nanoimprint lithography. *Nano Lett, 4*, 1225–1229. https://doi.org/10.1021/nl049487q

Kastalskiy, I. A. (2017). *Analysis of signals of network activity of biological systems and applied aspects of their use in neural interface devices*. Nizhny Novgorod.

Kuzmin, E. A., Volkova, E. E., & Fomina, A. V. (2019). Research on the concentration of companies in the electric power market of Russia. *International Journal of Energy Economics and Policy, 9*(1), 130–136. https://doi.org/10.32479/ijeep.7169

Lambert, T. E. (2020). Monopoly capital and innovation: An exploratory assessment of R&D effectiveness. *International Review of Applied Economics, 34*(1), 36–49. https://doi.org/10.1080/02692171.2019.1620703

Lee, E. A. (2006). Cyber-physical systems – are computing foundations adequate? *NSF Workshop on Cyber-Physical Systems: Research Motivation, Techniques and Roadmap*. October 16–17, 2006 Austin, TX.

Lee, E. A., & Seshia, S. A. (2011). *Introduction to embedded systems – A cyber-physical systems approach*. MIT Press.

Litau, E. (2018a). Information flows management as a way to overcome "Puberty challenges" of a small enterprise. *ACM International Conference Proceeding Series*, 34–38. https://doi.org/10.1145/3278252.3278259

Litau, E. (2018b). The information problem on the way to becoming a "Gazelle." In *Proceedings of the European Conference on Innovation and Entrepreneurship, ECIE* (Vol. 2018-September, pp. 394–401).

Marani, R., Gelao, G., & Perri, A. G. (2015). *A review on memristor applications*. Retrieved from https://arxiv.org/ftp/arxiv/papers/1506/1506.06899.pdf.

Matkarimov, J. (2018). The use of cloud computing technology in the learning of computer science. *Educational Process, 2*, 17–21.

Metaxas, T. (2016). Corporate social responsibility in European organizations: A universal idea? *Journal of Eurasian Social Dialogue, 1*(2), 30–40.

MI. (2020). Global memristors market - growth, trends, and forecast (2020–2025). *Mordor Intelligence*. Retrieved from https://www.mordorintelligence.com/industry-reports/memristor-market.

MM. (2017). Next-Generation Memory Market by Technology (Volatile (HMC and HBM), and Nonvolatile (MRAM, FRAM, RERAM, 3D XPoint, NRAM)), Wafer Size (200 mm, 300 mm, and 450 mm), Application, and Geography - Global Forecast to 2023. *Markets and Markets*. Retrieved from https://www.marketsandmarkets.com/Market-Reports/Memristor-Memory-Market-632.html.

MMR. (2019). Global Memristor Market – Industry Analysis and Forecast (2019–2026) – by Type, Industry Vertical, and by Geography. *Maximize Market Research*. Retrieved from https://www.maximizemarketresearch.com/market-report/global-memristor-market/29514/#details.

MRO. (2015). Memristor Market (By Type: Spin Based & Magnetic Memristor, and Molecular & Ionic Film Memristor; By Industry Vertical; By Geography) Global Scenario, Market Size, Outlook, Trend and Forecast, 2015–2024. *Market Research Outlet*. Retrieved from https://www.marketresearchoutlet.com/report/memristor-market.

Muraviev, K. A., Prudius, A. A., Vlasov, A. I., & Uzenkov, D. A. (2019). Load balancing in big data processing systems. *International Review of Automatic Control, 12*(1), 42–47. https://doi.org/10.15866/ireaco.v12i1.16808

MW. (2020). Global Memristors Market In-depth Analysis, Competitive Landscape and Future Scope from 2020 to 2025. *Market Watch*. Retrieved from https://www.marketwatch.com/press-release/global-memristors-market-in-depth-analysis-competitive-landscape-and-future-scope-from-2020-to-2025-2020-05-12?mod=mw_quote_news.

Pechatnick. (2010). How will memristors change the IT market? Why won't a photon computer appear? Why did HP acquire sophisticated science equipment on eBay? *Pechatnick*. Retrieved from https://pechatnick.com/news/kak-memristori-izmenyat-it-rinok-pochemy-fotonnii-komputer-ne-poyavitsya-pochemy-hp-priobretala-slojnoe-naychnoe-oborydovanie-na-ebay.

Politbook. (2020). The concept of a memristiveneurohybrid chip for use in neurointerfaces and neuro prostheses was developed by scientists from Lobachevsky University in collaboration with colleagues from Russia, Italy, China and the USA. Retrieved from https://politbook.ru/articles/novosti/kontseptsiya-memristivnogo-neyrogibridnogo-chipa-dlya-ispolzovaniya-v-neyrointerfeysakh-i-neyroprote.

Potkina, E. S., & Kholopova, L. A. (2014). Development of information technologies. *Concept, 4*, ART 14612, 1–4.

PRN. (2019). Global Memristors Market - Growth, Trends, and Forecast (2019–2024). *PR Newswire*. Retrieved from https://www.prnewswire.com/news-releases/the-memristors-market-was-valued-at-usd-278-05-million-in-2018-and-is-expected-reach-usd-8879-25-million-by-2024-to-register-a-cagr-of-52-7-during-the-forecast-period-2019--300933803.html.

Puurunen, R. L. (2005). Surface chemistry of atomic layer deposition: A case study for the trimethylaluminum/water process. *Journal of Applied Physics, 97*, 121301. https://doi.org/10.1063/1.1940727

RM. (2018). Memristor Market - Forecasts from 2018 to 2023. *Research and Markets*. Retrieved from https://www.researchandmarkets.com/reports/4618275/memristor-market-forecasts-from-2018-to-2023.

Sampath, M., Mane, P. S., & Ramesha, C. K. (2015). Hybrid CMOS-memristor based FPGA architecture. *2015 International Conference on VLSI Systems, Architecture, Technology and Applications (VLSI-SATA)*. Bangalore. Pp. 1–6. https://doi.org/10.1109/VLSI-SATA.2015.7050461

Sherief, N., Ahmed, S. D., El-Sayed, M. E., & Hassan, M. (2019). Memristor NRSC 2019. National Radio Science Conference (NRSC 2019).

Shukla, G., & Sharma, K. (2017). Memristor Market by Type (Molecular & Ionic Film memristor and Spin Based & Magnetic Memristor) and Industry Vertical (Electronics, IT & Telecom, Industrial, Aerospace & Defense, Automotive and Healthcare) - Global Opportunity Analysis and Industry Forecast, 2014-2022. Report Overview. Retrieved from https://www.alliedmarketresearch.com/memristor-market.

Snider, G., Amerson, R., Carter, D., Abdalla, H., Qureshi, M. S., Leveile, J., Versace, M., … Mingolla, E. (2011). From synapses to circuitry: Using memristive memory to explore the electronic brain. *Computer, 44*(2), 21–28. https://doi.org/10.1109/MC.2011.48

Statista. (2020). Number of connected wearable devices worldwide by region from 2015 to 2022. Retrieved from https://www.statista.com/statistics/490231/wearable-devices-worldwide-by-region/

The fourth industrial revolution. (2017). Retrieved from www.tadviser.ru/index.php/Статья:Четвертая_промышленная_революция_(Industry_Индустрия_4.0).

TIP. (2020). Memristor Market Forecast to 2027. *The Insight Partners*. Retrieved from https://www.theinsightpartners.com/reports/memristor-market/.

TMR. (2017). Memristor Market - Global Industry Analysis, Size, Share, Growth, Trends and Forecast 2017–2025. *Transparency Market Research*. Retrieved from https://www.transparencymarketresearch.com/memristor-market.html.

Toomsalu, L., Tolmacheva, S., Vlasov, A., & Chernova, V. (2019). Determinants of innovations in small and medium enterprises: A European and international experience. *Terra Economicus, 17*(2), 112–123. https://doi.org/10.23683/2073-6606-2019-17-2-112-123

Vasilyev, V. A., & Chernov, P. S. (2012). Memristor as a promising component of nanoelectronics. *Proceedings of the International scientific and technical conference INTERMATIC – 2012*. Part 4. Pp. 91–94.

Vera-Tasama, A., Gomez-Cano, M., & Marin-Hurtado, J. I. (2019). Memristors: A perspective and impact on the electronics industry. *2019 Latin American Electron Devices Conference (LAEDC)*, Armenia, Colombia, pp. 1–4. https://doi.org/10.1109/LAED.2019.8714735

Veretennikov, A. V. (2017). BigData: Big data analysis today. *Young Scientist, 32*(166), 9–12.

Vichugova, A. (2020). Digitalization of production and digital twins: combining PLM, IoT and Big Data. Retrieved from https://www.bigdataschool.ru/bigdata/digital-twin-plm-iot-big-data.html.

Wasa, K., & Hayakawa, S. (1993). *Handbook of sputter deposition technology*. William Andrew.

Whitaker, D. A., Egan, D., O'Brien, E., & Kinnear, D. (2018). *Application of multivariate data analysis to machine power measurements as a means of tool life predictive maintenance for reducing product waste*. Retrieved from https://arxiv.org/abs/1802.08338.

Witten, I. H., & Frank, E. (2016). *Data mining: Practical machine learning tools and techniques*. Morgan Kaufmann. Pp. 7–9.

Yener, S. C., & Kuntman, H. (2012). A new CMOS-based memristor implementation. *In Proc. of 2012 International Conference on Applied Electronics*. Pilsen (Czech Republic). Pp. 345–348.

Yudin, A., Kolesnikov, M., Salmina, M., & Vlasov, A. (2017). Project oriented approach in educational robotics: From robotic competition to practical appliance. *Advances in Intelligent Systems and Computing, 457*, 83–94. https://doi.org/10.1007/978-3-319-42975-5_8

Andrey I. VLASOV, Cand.Sci. (Engineering), Associate professor of the department IU4 "Designing and Technology of Electronic Equipment", assistant manager as IU4 chair on scientific work of the Bauman Moscow State Technical University (Moscow, Russian Federation). Research interests: neural networks, stable operating systems, Internet of things (IoT), public-private partnerships, economic sustainability.
ORCID ID: orcid.org/0000-0001-5581-4982

Ivan V. GUDOSHNIKOV, Master student of the department IU4 "Designing and Technology of Electronic Equipment" of the Bauman Moscow State Technical University (Moscow, Russian Federation). Research interests: systems analysis, systems technology, Internet of things (IoT).
ORCID ID: orcid.org/0000-0003-0548-4860

Vladimir P. ZHALNIN, Cand.Sci. (Engineering), Associate professor of the department IU4 "Designing and Technology of Electronic Equipment", Bauman Moscow State Technical University (Moscow, Russian Federation). Mr. Zhalnin has published over 30 research works. The main area of his research includes micro- and nanoelectronics and nanotechnology. Research interests: memristive technologies, systems technology, economic sustainability.
ORCID ID: orcid.org/0000-0002-9645-2436

Aksultan T. KADYR, Masters student of the department IU4 "Designing and Technology of Electronic Equipment" of the Bauman Moscow State Technical University (Moscow, Russian Federation). Research interests: systems analysis, systems technology, Internet of things (IoT).
ORCID ID: orcid.org/0000-0003-4462-8281

Vadim A. SHAKHNOV, Corresponding member of RAS, Dr.Sci. (Engineering), Professor, Head of the department IU4 "Designing and Technology of Electronic Equipment" of the Bauman Moscow State Technical University (Moscow, Russian Federation). Research interests: multidimensional data, industrial production, technological control, modeling and optimization of processes, knowledge management, professional education.
ORCID ID: orcid.org/0000-0003-4013-1905

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:
@Entrepr69728810

DEVELOPMENT OF PROXIMITY IN CLUSTER ORGANIZATIONS

Anna Maria Lis

Gdańsk University of Technology, Gabriela Narutowicza 11/12, 80-233 Gdansk, Poland

E-mail: Anna.Lis@zie.pg.gda.pl

Abstract. Sustainable development in cluster organizations (COs) is most fully manifested in the synergy effect. In turn, the synergy effect is achieved thanks to the development of proximity among cluster entities. The purpose of the paper is to test two conceptual models reflecting relations between selected dimensions of proximity in cluster organizations. The author reports the findings of a quantitative study conducted in four COs. The basic technique for collecting data was an online questionnaire. Both theoretical models were tested using Structural Equation Modelling.The research goes beyond the state-of-the-art knowledge in the concept of industrial cluster by exposing a broader view on cluster cooperation, which is developed on the basis of geographical proximity, and simultaneously contributes to the development of proximity in other dimensions: social, competence and organizational.

Keywords: cluster; cluster organization; cluster cooperation; proximity

1. Introduction

The review of theoretical concepts regarding the issue of cooperation among economic entities anchored in a specific location shows their strong connection with a broad understanding of the category of proximity. It turns out that regardless of whether Marshall's industrial districts or other theories perceiving the region as a hub of knowledge (including the cluster concept) are analyzed, each of these ideas uses elements directly related to the concept of proximity. This is important because without "proximity", many elements that make up the definitions of subsequent forms of the coexistence of economic entities operating in a given territory would be beyond the reach of influence of the entities managing them. As numerous studies show, proximity in various dimensions enables synergy to be achieved. According to Porter's approach, the cluster is a system of mutually related companies and institutions, and its value as a whole is greater than the sum of the values of its individual parts (Porter, 2008). Cooperation in clusters, based on geographical proximity facilitating the development of strong and lasting interactions within the cluster leads to the synergy effect, which is the basis for the sustainable

development of the cluster and its constituent entities, but also for the region in which the cluster operates. Porter clearly emphasizes the competitive advantage of clusters, claiming that cooperation in clusters has a positive effect on increasing the efficiency, innovation and entrepreneurship of the enterprises operating in clusters. Despite the accompanying competition risk, cluster cooperation could therefore be considered as one of the forms of modern entrepreneurship that could help in the sustainable development of enterprises, especially those representing the SME sector (Havierniková & Kordoš, 2019). "Proximity" provides a specific concretization of the features, processes and mechanisms underlying the business activity of entities, and thus facilitates their understanding, increasing the possibility of effective management. The knowledge of proximity and its dimensions, as well as the ability to apply it in practice, therefore, seems to be extremely important for the management of both individual enterprises and groups of enterprises associated in higher-order organizations, including cluster organizations (COs).

Meanwhile, the concept of proximity, although cognitively attractive, is still a scarcely explored area in management sciences. The literature especially lacks publications that would connect the concept of proximity with cluster organizations (not clusters). As a result of a systematic review of the literature, no publication was found that would associate different dimensions of proximity with COs. In the databases (Web of Science Core Collection and Scopus), only publications combining the issue of proximity with the concept of clusters were found (e.g. Yamada & Kawakami, 2015; Levy & Talbot, 2015; Bahlmann, 2016). This is also due to the fact that most publications in scientific literature refer to clusters viewed in geographical or economic categories, yet only a few of them address clusters as organizations. Insufficient recognition of the issues related to the development of cooperation in COs, and their poor description in the literature as well as the lack of publications combining the concept of COs with the concept of proximity, which is a visible juxtaposition regarding the dynamic development of these structures in the world, indicate a huge cognitive, research and methodological gap.

The paper reports the findings of a quantitative study based on an analysis of four COs from the metal and the ICT industries in Poland concerning the dynamics of proximity and its role in the development of cooperative relationships in COs. The study presented in this paper should be considered as a continuation of the author's earlier study on the development of proximity in COs, in which priority was given to qualitative research (Lis, 2018). The aim of the current study was to test two research hypotheses formulated as part of the concept of proximity, developed on the basis of the qualitative research, reflecting the relations between the individual dimensions of proximity in COs.

The research goes beyond the state-of-the-art knowledge in the concept of industrial clusters (with a particular emphasis on cluster organizations) by exposing a broader view of cluster cooperation, which is, on the one hand, developed on the basis of specific dimensions of proximity (especially geographical proximity), and on the other, contributes to the development of proximity in other dimensions. Although the study was conducted in Poland, it offers findings that may be verified in other countries, especially those in the EU where cluster policies are implemented, focused on cluster development by means of COs.

The paper is organized in the following manner. Firstly, the paper contains a literature review on proximity, and its dynamics and connection with industrial clusters. Secondly, it includes details with regard to the methodology: conceptual assumptions and research hypotheses, operationalization, the research sample, and the techniques for collecting and analyzing data. The third part reports the empirical results. Finally, there is a discussion, followed by conclusions with the study contributions, limitations and directions for future research.

2. Literature review

2.1. Proximity and its dimensions

The use of "proximity" for scientific research and analysis in the economic field began to gain popularity at the end of the twentieth century. Since then, more and more scientific works on this issue have been produced. According to the latest systematic review of the literature, around 2,8 thousand papers on proximity are identified in the Web of Science Core Collection database, whereas in the Scopus database this number is even higher (almost 4,000). In the 1980s and early 1990s, the literature on proximity was dominated by an approach that concentrated on the relationships within an organization (Monge et al., 1985; Rice & Aydin, 1991). Since the mid-1990s, the focus of attention shifted to the inter-organizational context of proximity (Klimas, 2011; 2020). The development of the concept of "proximity" as well as its dissemination in the literature was largely influenced by the French school of proximity (Rallet & Torre, 1999; Gilly & Torre, 2000; Torre & Rallet, 2005), emphasizing that proximity is the key element in the process of coordinating economically oriented activities. It facilitates the transfer of knowledge, improves the mechanisms of providing strategic information and has a positive effect on conflict resolution (Boschma et al., 2014). In addition, proximity is considered to be a factor that significantly improves the processes of cooperation among entities (Petruzzelli et al., 2009), reduces uncertainty in relationships (Boschma, 2005a; Paci et al., 2014) and remains conducive to the development of innovation.

The term "proximity" is merely a common term that refers to a set of specific aspects; however, the list of these aspects is neither complete nor unambiguous. Researchers most often refer to the five dimensions of proximity proposed by Boschma: geographical, cognitive, social, organizational and institutional proximity (Boschma 2004; 2005a; 2005b; Boschma & Frenken, 2010; Boschma et al., 2014; Balland et al., 2015). In terms of the number of publications in the above-mentioned databases referring to individual dimensions of proximity, geographical proximity takes first place. Second place is occupied by social proximity, followed by organizational then cognitive proximity, with the institutional dimension at the end of the list (Lis, 2018).

Geographical proximity is characterized by slight ambiguity (Knoben & Oerlemans, 2006). Relatively, the most common understanding of geographical proximity is Boschma's definition, according to which it is defined as the physical distance between actors, and this distance can be understood as a distance measured in specific units or as the time necessary to move from point A to point B (Boschma et al., 2014; Boschma, 2005a). Social proximity refers to relationships among entities, characterized by the trust created due to at least one of the following reasons: kinship ties, bonds of friendship, ties based on the past, personal experience connecting the analyzed entities (Boschma, 2005a; Heringa et al., 2014; Broekel & Boschma, 2012). The positive impact of social proximity on the results of cooperation among entities has already been quite well described in the literature, with a particular emphasis on the impact of relationships on the exchange of tacit knowledge (Boschma, 2005a; Boschma et al., 2014; Doloreux, 2002) and higher innovation (Tremblay et al., 2003; Paci et al., 2014; Guerini et al., 2013), and therefore factors that can be associated with cognitive proximity. The most general understanding of cognitive proximity indicates that this term is simply the similarity in the processes of receiving, interpreting, understanding and assessing the world (Wuyts et al., 2005). Cognitive proximity can also be understood as the degree of convergence of the knowledge systems of the analyzed entities. The importance of cognitive proximity manifests itself in many issues, but the key aspect to which this dimension of proximity applies is the process of knowledge exchange and creation. It is an element necessary for the proper functioning of communication processes and knowledge transfer mechanisms, as it enables the accurate identification, proper interpretation and effective use of new elements in the knowledge system (Cohen & Levinthal, 1990). The designations of the last two identified dimensions of proximity – organizational and institutional – overlap to a large extent, but maintaining the separateness of these categories allows their characteristic features to be captured. Using the existing understanding of organizational proximity (Knoben & Oerlemans, 2006; Boschma, 2005a; Boschma et

al., 2014), it can be defined as the suitability of two or more organizations in terms of both the logic of similarity (e.g. the similarity of internal structures and processes, the degree of inter-organizational dependencies) and the logic of belonging (sharing a specific space of relations, e.g. in participation in the same higher-order organizations as the CO). In turn, most approaches to institutional proximity are based on the concept of "institution" proposed by North (North, 1990). This dimension of proximity can be understood as the degree of overlap between the formalized elements of normative order (legal provisions and administrative requirements in force in a given area) and the informal system of values, thinking and behavioral patterns within which the analyzed entity and the entities associated with it operate.

2.2. Dynamics of proximity

A characteristic feature of each of the created proximity dimensions is their dynamic nature. The static perspective gives "proximity" primacy over relationships, while in the dynamic perspective, the analysis focuses on conditions in which "proximity" becomes the source of relationships or the relationships produce "proximity". There is no dimension of proximity that would function in perfect isolation from the other dimensions. This means that the dynamics of a particular aspect of proximity are influenced not only by what happens within that particular aspect, but by anything that occurs in each of the other dimensions. The dimensions of proximity create a structured system in which each element is related to the others, and the changes occurring in one part of the system affect different areas with different strengths. From the point of view of dynamics, it is also important that each of the dimensions of proximity differs from the others not only in the nature of the relationships it describes, but also in a certain "susceptibility" to change. This means that some of the dimensions of proximity are much more flexible (they are more often and easily changed), while others react with a delay and a smaller scope of introduced modifications. The literature review shows that the dimension relatively the most prone to change is social proximity (Dosi & Nelson, 1994), and the hardest to change, relatively, is the geographical dimension (Stam, 2007).

Geographical proximity is a unique dimension of proximity, especially in the context of COs. This is the most difficult to modify, but also the most basic and earliest recognized type of proximity. Geographical proximity can stimulate other dimensions of proximity, and is often replaced by them (Boschma, 2005a). Geographical proximity, although not a prerequisite for the establishment of cooperative relationships among economic entities, may act as a factor supporting the formation of such relationships in other aspects of proximity. The effect of a physical "neighborhood" will almost always contribute to the formation of a specific "overlay" between the spatial dimension of proximity and its other dimensions (Malmberg & Maskell, 2006). This applies especially to proximity in the social dimension (Hansen, 2015). However, this is not obvious in the case of cognitive and organizational proximity, which have the feature of the substitutability of geographical proximity. Geographical proximity can strengthen cognitive proximity (Paci et al., 2014; Guerini et al., 2013; Boschma, 2005a). This gains importance especially in cases where establishing cooperation is accompanied by a low level of cognitive proximity among potential partners. With a high level of cognitive proximity, however, the relevance of geographical proximity significantly decreases (Singh, 2005). Compatible knowledge bases of cooperating entities allow effective cooperation even when the involved partners are significantly distant from each other (Hansen, 2015). Geographical proximity is not a catalyst for processes of the constitution and strengthening of organizational proximity – both in its intra- and inter-organizational dimension. In addition, when organizational proximity reaches a high level, i.e. when there is a detailed and precise division of tasks within the organization, coordinated by a strong, central core and partners share common experiences (an element of cognitive proximity), the need to be in geographical proximity may disappear (Rallet & Torre, 1999).

The lack of common ground resulting from the nature of the location of the enterprise may act as a brake on the development of emerging or already established cooperative relationships. Too low a level of geographical proximity characterizing relationships among entities means the lack of a certain group of common conditions

determining the nature of their activities. However, too large a level of geographical proximity may have an equally negative impact on the activities of cooperating enterprises (Malmberg & Maskell, 1997; Boschma, 2005a).

2.3. Proximity in industrial clusters

The concept of proximity can be superimposed on the concepts developed so far in the literature of the cooperation of economic entities embedded in a specific territory, which all emphasize the inseparable link between geographical proximity and other dimensions of proximity.

The vision of the industrial district is an example of an almost complete approach to the issue of synergies occurring among business entities (in terms of the scope of including factors related to various dimensions of proximity). In Marshall's industrial districts (Marshall, 1890), as in the Italian industrial districts (Pyke et al. 1990; Becattini 2002; Bellandi, 2002; Sforzi, 2002), next to the obvious connections between the concept of the district and geographical proximity, threads can be seen highlighting the importance of other dimensions of proximity. The different dimensions of proximity: cognitive (knowledge spillovers, the similarity of entities in terms of their set of competences and used technology, as well as their complementary diversity), social (relatively stable relationships among entities), organizational (phases and technically divisible production processes implemented in the cooperation of entities) and institutional (anchored in the local system of values and norms) play the role of pillars in the industrial district arising from the foundation of geographical proximity. The group of theories of regional development based on knowledge and innovation (Martin, 2003) are focused to the greatest extent on the threads which emphasize the role of cognitive proximity (appearing primarily in the context of innovation and pro-innovation activities), which does not mean, however, that they ignore the role of other dimensions of proximity. Nevertheless, each of these concepts emphasizes a different dimension of proximity. Cognitive proximity plays a key role in the concept of the learning region (Florida, 1995; Asheim, 1996; Morgan, 1997). This concept puts special emphasis on the mechanisms and processes responsible for the relative overlap of the competency sets of entities operating in a specific area. The concept of the innovative milieu (Aydalot, 1986; Camagni, 1991; Maillat, 1998) emphasizes social and institutional proximity – that is, networks of informal social contacts based on trust, developing on a common socio-cultural basis. A similar accent can be found in concepts emphasizing the systemic dimension of innovation: regional innovation system RIS (Braczyk et al. 1998; Cooke 2001; Doloreux & Parto, 2005) or innovation ecosystem (Adner, 2006; Autio & Thomas, 2014). They pay attention to the role of institutions and the relations among actors – in the RSI concept, the links between entities (social and organizational proximity), and the processes of generating and diffusing knowledge (cognitive proximity) are spotlighted, but additional emphasis is placed on the culture and institutions which determine the cooperation of entities (connected to institutional proximity). In the innovation ecosystem concept, proximity appears primarily in the organizational (the division of work among organizations based on their specialization), cognitive (the complementarity of knowledge and skills) and social (the interrelationships of system components) dimensions, while the rank of geographical and institutional proximity is slightly lower compared to the other discussed concepts.

In the cluster concept developed by Porter (1998; 2000; 2008), individual dimensions of proximity can also be highlighted. Already through the very definition of the cluster, Porter linked threads of geographical proximity (a geographical cluster of entities of various types), organizational proximity (the fact of participation in the same higher-order structure), social proximity (the simultaneous cooperation and competition of the entities forming the cluster), cognitive proximity (the similarity of competences related to belonging to the same sector) and institutional proximity (broadly understood as the cultural and administrative bases for conducting business by the entities involved in a given cluster). However, cluster organizations are separate entities and cannot be identified with clusters. They should be understood as formally established organizations which function at a higher level of aggregation, are composed of institutional members that have joined them purposefully, and act actively in order

to achieve some collective or individual objectives (Lis, 2018). Cluster organizations, also referred to in the literature as bottom-up clusters or cluster initiatives, are focused on supporting the development of a given cluster (Sölvell et al., 2003; Lindqvist et al., 2013). Due to the obvious connotations with the cluster (the CO concept has grown on the foundations of the cluster concept), the CO is based on similar types of proximity (primarily, the geographical and institutional dimensions), although they may be slightly differently shaped (this applies especially to proximity in the social, cognitive and organizational dimensions). The differences between the cluster and the cluster organization can also be manifested in the relationships occurring between individual dimensions of proximity.

3. Methodology

3.1. Conceptual assumptions

The qualitative research on which the current research is based was conducted by Lis in 2016. As a result of this prior research, two theoretical concepts were generated (Lis, 2018). These concepts are interrelated, hence they can be treated as one coherent theoretical concept, allowing for a better understanding and explanation of the mechanisms of cooperation in COs. The first concept covers the trajectory of the development of cooperative relationships in COs, while the second one concerns the development of proximity in such organizations. As part of the first developed concept, four main levels of cluster cooperation were identified, with regard to "the main objectives", indicating the key type of activity in COs (Tab. 1). The second concept, raised to a higher level of abstraction and applied to the first concept, explains how proximity can support the development of cooperation in COs. The research results have proved that different dimensions of proximity strongly affect every single identified level of cooperation. In turn, cooperation at every level causes the development of proximity in various dimensions. This is reflected in the objectives defined at individual levels of cooperation that correspond to different types of proximity, and therefore their achievement may mean the development of proximity in a specific (assigned to a given level) dimension. In Table 1, each level of cooperation has been assigned defined objectives and dimensions of proximity have been identified at the entry and exit levels.

Table 1. Levels of the development of cooperation in cluster organizations

Level number	Level name	Main objectives	Proximity: entry	Proximity: exit
I	"Integration at the unit level"	1. Creating a base network of relationships among cluster partners	– Geographical, competence – Competence proximity (in terms of the scope of competence)	– Social proximity
II	"Allocation and integration at the process level"	2. Facilitating access to the increased pool of resources, including information 3. Increasing the quality of products and services and / or reducing the business costs	– Competence proximity (in terms of the scope of competence)	– Competence proximity (in terms of the level of competence development) – Organizational proximity
III	"Impact on the environment"	4. Gaining impact on the external environment of the organization	– Geographical, competence – Competence proximity (in terms of the scope of competence)	– Institutional proximity
IV	"Creation and integration at the organizational level"	5. Setting up conditions to create common added value by pooling resources	– Social proximity – Competence proximity (in terms of the scope of competence) – Competence proximity (in terms of the level of competence development)	– Social proximity – Competence proximity – Organizational proximity

Source: Lis, 2018.

121

All the conceptual categories used to create both generated concepts were based on the conducted qualitative research. The individual elements of the concepts were therefore not a preconceived idea, but constituted the best theoretical explanation of the tendencies observed from the qualitative research in the analyzed organizations. The identified dimensions of proximity basically coincided with the classic Boschma division (2004; 2005a; 2005b), with the exception of cognitive proximity. The results of the empirical research showed that – in need of a better explanation of the development of cooperation in the studied COs – it would be necessary to slightly differentiate proximity in this dimension. Based on the research, it could be seen that the relationships among cluster entities were shaped differently when their similarity was visible in the scope of their competences, and differently when this similarity related to the level of advancement of these competences. The above observation led to the distinction of a completely new dimension of proximity: "competence proximity" (taking into account both the scope of competences and the level of competence development) in place of "cognitive proximity".

Moving along the developed trajectory for the development of cooperation in COs (going from level I to level IV), relationships among different types of proximity were identified: the development of cooperative relationships in COs is determined by geographical and competence proximity (in terms of the scope of competences), on the basis of which (with the commitment of cluster entities) social and institutional proximity are developed, followed by competence proximity (in terms of the level of competence development) and organizational proximity (Fig. 1). In the developed model, in addition to proximity in various dimensions, an additional variable emerged on the basis of the qualitative research: the commitment of cluster members in activities undertaken as part of the CO.
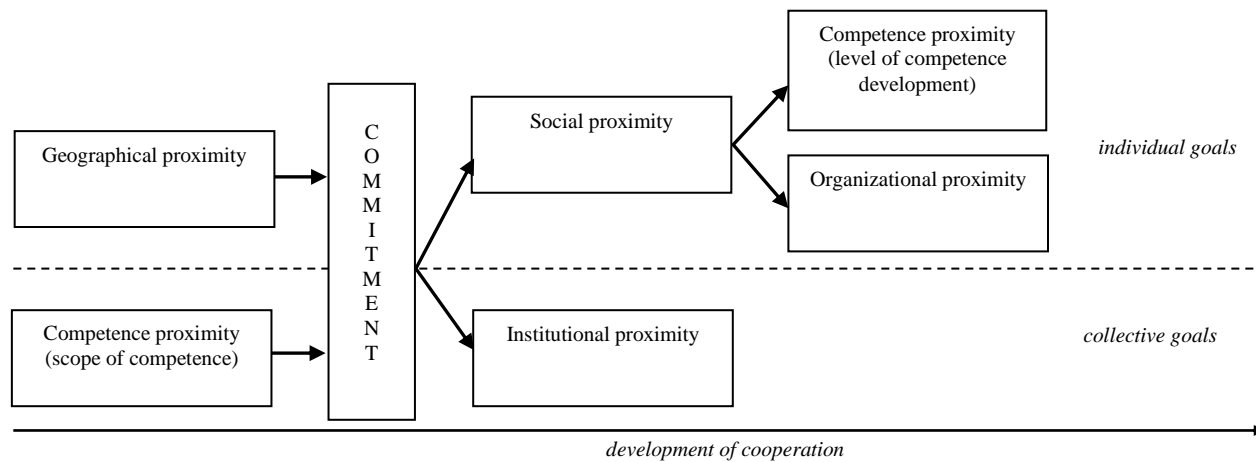
Figure 1. Links between dimensions of proximity

Source: Lis, 2018.

3.2. Research hypotheses

The combination of levels of cooperation with the specific proximity dimensions expected at the "entry" and "exit" of a given level, with linking together the identified dimensions of proximity, allows the analysis of proximity in dynamic terms. This gives rise to the formulation of two research hypotheses (additionally divided into constituent hypotheses), reflecting the complex nature of the cause-effect relationships occurring between selected dimensions of proximity in COs (Table 2). The H1 and H2 hypotheses focus only on three successive

levels (I, II, IV), best illustrating the development of cooperation in COs. The hypotheses do not take into account level III, referring to the relationships among cluster members and external entities (from outside the CO). The qualitative research shows that institutional proximity (responsible for achieving objectives at level III) plays an insignificant role in the development of inter-organizational cooperation.

Table 2. Research hypotheses

Research hypotheses	Constituent hypotheses
H1. Social proximity created on the basis of geographical proximity has a positive impact on the development of competence proximity (in terms of the level of competence development) and organizational proximity.	H1.1. Geographical proximity has a positive effect on the development of social proximity.
	H1.2. Social proximity has a positive impact on achieving the objectives directly related to the development of competence proximity (in terms of the level of competence development) and organizational proximity.
	H1.3. Social proximity has a positive impact on gaining access to information and knowledge, determining the development of competence proximity (in terms of the level of competence development).
	H1.4. The achievement of the objectives directly related to the development of competence proximity (in terms of the competence development level) and organizational proximity positively affects the access to information and knowledge.
H2: Geographical proximity is important for the constitution and development of a cluster organization because it has a positive impact on the commitment of cluster members, which – in turn – has a positive impact on the development of social proximity.	H2.1. Geographical proximity has a positive impact on the commitment of cluster members.
	H2.2. The commitment of cluster members has a positive impact on the development of social proximity.

Source: Lis, 2018.

The relationships described in the form of the H1 and H2 hypotheses form two multidimensional conceptual models, tested in this paper (Fig. 2) (the separation of the H1 and H2 hypotheses was due to conceptual and methodological reasons).
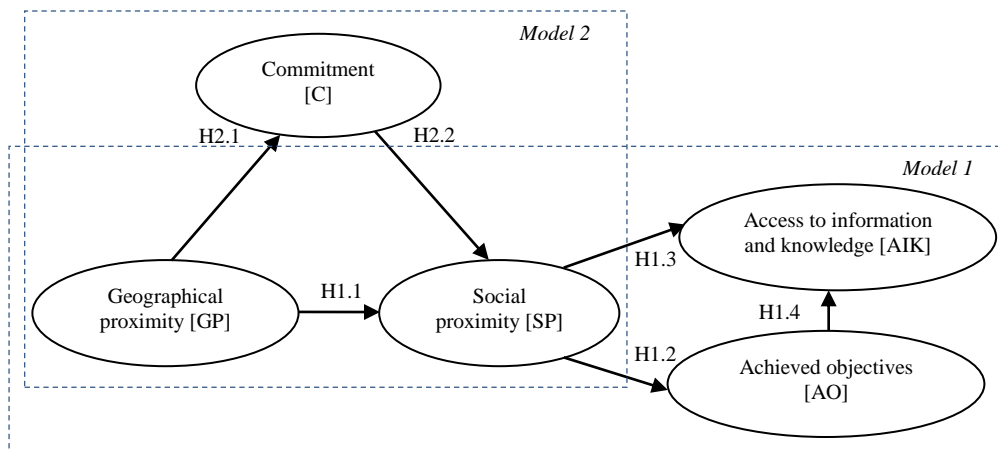
Figure 2. Conceptual models
Source: Lis, 2018.

3.3. Operationalization

The latent variables used in both models were operationalized by selecting the appropriate observable indicators, and additionally using exploratory factor analysis. An ordinal scale (5-point Likert scale) was used to measure the variables. In Model 1, a total of 4 latent constructs were used, described using 15 observable indicators. To measure geographical proximity [GP], three variables were used to refer to the physical distance among cluster entities. Social proximity [SP] was described by three variables showing the process of creating bonds among cluster members: starting from the development of relationships, through trust building, to the verification of trust based on the experience of cooperation. Another variable – achieved objectives [AO] – in the proposed conceptual model was reduced to three objectives directly related to the development of competence proximity (objective 1 – corresponding to level II) and organizational proximity (objective 2 – level II, objective 3 – level IV). The last variable in the model – access to information and knowledge [AIK] (determining the development of competence proximity in the discussed aspect) – was described using six observable variables.

Model 2 uses 3 latent constructs (described using in total 14 observable indicators): geographical and social proximity (appearing in Model 1) and commitment [C], measured on the basis of eight observable variables corresponding to individual levels of cooperation in COs (the two most characteristic forms of commitment for each level).

3.4. Research sample

The research was carried out in 2017 in four purposefully selected cluster organizations in Poland. The same COs that participated in the earlier qualitative research (2016) were selected for the quantitative research. In the selection of COs the extreme cases approach was used to ensure maximum variability and diversity within the research field. Taking the economic sector as the main differentiating criterion, the research was conducted in two COs representing the ICT industry (Mazovia Cluster ICT [MC ICT] and Interizon: Pomeranian Region ICT Cluster) and two from the metal industry (Metal Cluster of Lubuskie Province [MCLP] and Metal Working Eastern Cluster [MWEC]).

The surveyed cluster organizations are formal organizations that were launched at a similar time (in the period 2007-2009). They also have a similar, regional scope of activity. However, they differ in the way they were established. All four COs wre created as a result of a large involvement of the enterprises, but only one of them (MCLP) is considered a bottom-up initiative, while the other three are mixed forms. In addition, COs representing the ICT sector are much larger than metal COs (the number of members in the studied COs in the analyzed period was: MCLP – 35, MWEC – 78, MC ICT – 200, and Interizon – 130). The research covered 132 cluster enterprises: 51 from metal COs (38 from MWEC and 13 from MCLP) and 81 from ICT COs (45 from MC ICT and 36 from Interizon).

3.5. Techniques for collecting and analyzing data

The basic technique for collecting data was an online questionnaire. Both theoretical models were tested using structural equation modeling. In the analysis, the two-step sequential approach of Anderson-Gerbing (1988; 1992) was used. Exploratory factor analysis and confirmatory factor analysis were used to test measurement models. Both analyses were performed using the maximum likelihood estimator and were based on the value of the KMO (Kaiser-Meyer-Olkin) measure of sampling adequacy. After testing the validity of the measures of the measurement models, structural models were constructed and all dependency paths in these models were analyzed, which allowed the research hypotheses to be tested.

4. Research results

4.1. Model 1

In the case of Model 1, exploratory factor analysis showed a very large fit of observable variables to latent constructs (the value of the KMO measure of sampling adequacy was 0.818, Bartlett's sphericity test was statistically significant, p <0.001). The main analysis used to verify the conceptual model was, however, confirmatory factor analysis (CFA). The value of χ^2 was 150.25 (DF = 84), while the value of CMIN / DF was 1.79. The RMR was achieved at an acceptable level of 0.07, as was the RMSEA approximation error, which reached 0.078 (which is within the acceptable limits, but within the upper limit for a good fit). The CFI and TLI exceeded the minimum 0.9 values adopted for well-matched models (Table 3).

Table 3. Confirmatory factor analysis results for Model 1

Variables	Cronbach's α	CR	AVE	Correlations between variables			
				[GP]	[SP]	[AO]	[AIK]
Geographical proximity [GP]	0,83	0,85	0,67	0,82			
Social proximity [SP]	0,77	0,78	0,54	0,28	0,73		
Achieved objectives [AO]	0,82	0,82	0,6	0,11	0,26	0,77	
Access to information and knowledge [AIK]	0,91	0,91	0,64	0,17	0,7	0,44	0,80

χ^2=150,25 (DF=84); CFI=0,94; TLI=0,92; RMSEA=0,078 (90%CI=0,057–0,097); RMR=0,07; CMIN/DF=1,79; AIC=222,25; *n*=132

Source: the author.

The standardized value of factor loadings of all adopted observable variables exceeded 0.5, and the vast majority (except for [GP3] and [SP3]) also 0.7 (all factor loadings were also statistically significant, p≤0.001). The AVE indicator calculated for each latent variable exceeded the recommended value of 0.5. The reliability measures: Cronbach's α and CR for each construct exceeded the limits of 0.7. All of the fit and convergence indicator values used exceeded their acceptability thresholds (Hair et al., 2014), which decided on the measurement model to adopt for the structural modeling process.

A structural model was then built in which the interaction between latent variables was assessed. Based on the conducted analysis, it was determined that Model 1 achieved the recommended degree of fit (Table 4).

Table 4. Path analysis results for Model 1

Hypotheses	β	t	p	Acceptance/ rejection
H1.1. Geographical proximity [GP] –> Social proximity [SP]	0,27	2,53	0,011	A
H1.2. Social proximity [SP] –> Achieved objectives [AO]	0,27	2,44	0,015	A
H1.3. Social proximity [SP] –> Access to information and knowledge [AIK]	0,62	5,35	0,000	A
H1.4. Achieved objectives [AO] –> Access to information and knowledge [AIK]	0,28	3,23	0,001	A

Legenda: χ^2=150,58 (DF=86); CFI=0,94; TLI=0,93; RMSEA=0,076 (90%CI=0,055–0,095); RMR=0,07; CMIN/DF=1,75; *n*=132

Source: the author.

The analysis of the paths did not give rise to the rejection of the H1.1-H1.4 hypotheses (all four paths proved to be statistically significant). It was established that geographical proximity had a positive impact on social proximity, which supported the H1.1 hypothesis. Social proximity had a positive impact on the achieved objectives, related – in this case – to competence proximity (in terms of the level of competence development) and organizational proximity, which in turn supported the H1.2 hypothesis. The very high β value associated with the H1.3

hypothesis supports the argument about the strong positive impact of social proximity on access to information and knowledge. It was also confirmed that the achieved objectives had a positive impact on access to information and knowledge in the studied COs (support for the H1.4 hypothesis), which contributed to the further development of competence proximity (in the indicated aspect).

4.2. Model 2

In the case of Model 2, exploratory factor analysis also showed a large fit of the developed constructs (KMO = 0.861, the Bartlett sphericity test was statistically significant, p <0.001). Based on confirmatory factor analysis, the initial model was slightly modified. Modification indexes have shown that it is worth correlating the latent residual variables in the construct "commitment" [C] (due to the high covariance values: e4 with e5, e5 with e9, e10 with e11). This allowed the model to be improved to fit to the planned constructs in accordance with the made assumptions[*]. After the above modification, the values of all indicators adopted for analysis fit within the recommended ranges: $\chi2$ - 123.18 (DF = 71), CMIN / DF – 1.73, RMR – 0.061, RMSEA – 0.075. The incremental fit indices were higher than 0.9: CFI reached 0.96 and TLI reached 0.95 (Table 5).

Table 5. Confirmatory factor analysis results for Model 2

Variables	Cronbach's α	CR	AVE	Correlations between variables		
				[GP]	[C]	[SP]
Geographical proximity [GP]	0,83	0,85	0,67	0,82		
Commitment [C]	0,93	0,93	0,64	0,34	0,80	
Social proximity [SP]	0,77	0,78	0,54	0,27	0,60	0,73

χ^2=123 (DF=71),18; CFI=0,96; TLI=0,95; RMSEA=0,075 (90%CI=0,052–0,097); RMR=0,061; CMIN/DF=1,73; AIC=191,18; *n*=132

Source: the author.

Tests on the accuracy of the proposed model were also successful: standardized factor loadings reached values higher than the acceptable level of 0.5, and almost all (with the same exceptions as in the first model, i.e. [GP3] and [SP3]) exceeded the minimum level of 0.7. For each latent variable, the AVE index value was over 0.5, while the values of Cronbach's α and CR coefficients were at a level exceeding the minimum threshold of 0.7. The positive assessment results of the measurement model allowed for its adoption to the next stage – structural equation modeling.

In the next step, an assessment of the interaction between latent variables was carried out, which allowed the research hypotheses to be tested. The analysis showed a good fit of the model (Table 6).

Table 6. Path analysis results for Model 2

Hypotheses	β	t	p	Acceptance/ rejection
H2.1. Geographical proximity [GP] –> Commitment [C]	0,34	3,66	0,000	A
H2.2. Commitment [C] –> Social proximity [SP]	0,60	5,84	0,000	A

χ^2=123,93 (DF=72); CFI=0,96; TLI=0,95; RMSEA=0,074 (90%CI=0,051–0,096);RMR=0,064; CMIN/DF=1,72; *n*=132

Source: the author.

---

[*] The values of the indicators before the modification were: χ^2=186,23 (DF=74); CFI=0,91; TLI=0,89; RMSEA=0,11 (90% CI=0,088 – 0,127); RMR=0,067; CMIN/DF=2,52; AIC=248,23; *n*=132.

The path analysis did not give grounds for rejecting the hypotheses H2.1-H2.2. The β value associated with the H2.1 hypothesis confirmed the statistically significant, positive impact of geographical proximity on the commitment manifested at all identified levels of cooperation in the COs. In turn, the commitment had a statistically significant, strong, positive impact on the development of social proximity, which supported the H2.2 hypothesis. This means that an increase in commitment in the activities within a CO will result in the development of relationships among cluster partners and vice versa – a decrease in involvement will weaken those relationships.

5. Discussion

Both conceptual models – Model 1 (based on the H1 hypothesis) and Model 2 (described by the H2 hypothesis), proved to be valid under the conditions of the study. The relationships between variables reflected in Models 1 and 2 show the development of proximity in a CO. Geographical proximity is conducive to the development of social proximity, taking into account the commitment factor. The short distance among cluster entities enables involvement in activities undertaken at various levels of cluster cooperation (I-IV), manifested through the personal contact of persons representing cluster members, which in turn leads to the development of increasingly stronger relationships within the CO. This in turn causes the development of competence proximity (in terms of the level of competence development) and organizational proximity. This means that as the distance among cluster entities decreases, the potential for developing relationships among them (social proximity) increases, which consequently increases the similarities in the competence systems of these entities in terms of their levels of competence (competence proximity, in the analyzed aspect) as well as in their internal structures and the existing degree of inter-organizational interdependencies (organizational proximity).

The obtained research results therefore support the thesis regarding the primacy of geographical proximity over other dimensions of proximity, but at the initial stages of the development of cooperative relations in COs. Geographical proximity turns out to be the most fundamental dimension in initiating cluster cooperation because it provides the basis for the formation and development of proximity in other dimensions. However, along with the gradual transition to higher levels of cooperation, the importance of a common location for the effects of cooperation undertaken by cluster enterprises decreases. This causes a decrease in the rank of geographical proximity, giving way to other dimensions of proximity, especially social and competence (in terms of the level of competence development) dimensions, which increase as a result of developing relationships that guarantee better access to resources, primarily to knowledge and information. At the highest level, to undertake the most advanced forms of cooperation, leading to the gradual organizational integration of cluster partners (and thus the development of organizational proximity), a high level of trust and a high, and at the same time, very similar level of competence among the cooperating entities are already required. Therefore, the higher the level of cluster cooperation, in conjuction with the development of proximity in the social, cognitive, and organizational dimensions, the greater the synergy effect resulting from this cooperation, and thus the sustainable development of the entire cluster structure can be.

Conclusions

The connection of the very current contemporary issue of clustering within the extremely rarely undertaken aspect of cluster organizations with the concept of proximity has no equivalent in the literature. Since no similar publications have been found in the existing literature combining the issue of proximity with the concept of the cluster organization (or cluster initiative), it is impossible to find scientific publications that would simultaneously address the three issues mentioned above: (cluster organizations – the development of cooperation – proximity). Relying on four COs representing two very different sectors of the economy, and using them to test the relationships between the four dimensions of proximity selected from among the five identified in the previously

conducted qualitative research significantly enriches the existing achievements in the area of the discussed issues. In addition, the results of the research take into account the assumptions regarding the dynamics of proximity. The reasoning behind combining the identified levels of cooperation in COs with the specific dimensions of proximity necessary "at the entry" and those arising or developing "at the exit" of each of these levels is an example of considering the dynamic aspect of proximity.

The empirical findings can also provide some practical implications for public authorities, cluster coordinators, as well as for cluster members. Politicians responsible for shaping cluster-based policy at various levels, taking care of sustainable cluster development, should launch instruments of cluster policy that would strengthen the development of proximity, especially in the cognitive and organizational dimension. This applies in particular to supporting innovation, because the lack of investment in innovation can lead to the process of decline of economic competitiveness (e.g. Bonetto et al., 2014), and event the declay of the whole cluster. In the case of cluster coordinators, the concern for sustainable development of partner cooperation within a cluster organization should be manifested in undertaking conscious and intentional activities leading to achieving ever higher levels of cooperation (from I to IV) and motivating cluster members to engage in these activities. Finally, cluster members, wanting to achieve the synergy effect resulting from cluster cooperation within the CO, should strive to create more or less informal relationships, which can translate into the development of proximity in other dimensions.

The research has three main limitations. The first limitation is the relatively small and not very diverse research sample. This, therefore, does not allow the findings to be generalized. Nevertheless, the applied logic of sample selection according to the extreme cases approach (the sector as a differentiating criterion) allows the thesis to be put forward regarding a wider universality of the discovered regularities. The second limitation is the subjectivity inscribed in the specifics of research conducted in the field of social sciences. This also applies to the quantitative research carried out in the proposed form. The problem of subjectivity in the study was partially solved, as the quantitative research was a continuation of the previously conducted qualitative research. Thus it can be considered a kind of triangulation of source data and research methods. The third limitation concerns the structural equation modeling used to test the hypotheses (H1-2). An important limitation is the size of the research sample adopted in the quantitative research because drawing conclusions based on the results of structural modeling is only possible if stringent methodological assumptions regarding sample size are met. There is no consensus on the minimum sample size in SEM – it is most often dependent on the complexity of the model (Hair, 2014; Anderson & Gerbing, 1988; 1992). The number of variables in the analyzed models in relation to the number of observations should not raise any objections, the more so in that both developed conceptual models were well fit and the defined variables proved to be reliable.

From the viewpoint of the replication of results, the research should be repeated on a representative, large, random sample, taking into account additional sectors of the economy, using the same measurement tools. This would allow the confirmation of theoretical constructs, and in the case of obtaining results consistent with those obtained in the conducted research – reveal the universality of the observed relationships. In future studies, it would also be necessary to carry out an estimation of mediation in both models (omitted in this paper). In Model 1, two variables can play the role of mediator: "social proximity" [SP] or "achieved objectives" [AO]; in Model 2 – "commitment" [C]. In order to increase the universality of the developed concept of proximity, it should also be considered to include new comparative groups in the research.

References

Adner, R. 2006. Match your innovation strategy to your innovation ecosystem, *Harvard Business Review* 84(4): 98-107.

Anderson, J. C., & Gerbing, D. W. 1988. Structural equation modeling in practice: A review and recommended two-step approach, *Psychological Bulletin* 103(3): 411.

Anderson, J. C., & Gerbing, D. W. 1992. Assumptions and comparative strengths of the two-step approach: Comment on Fornell and Yi, *Sociological Methods & Research* 20(3): 321–333. https://doi.org/10.1177/0049124192020003002

Asheim, B. R. T. 1996. Industrial districts as 'learning regions': a condition for prosperity, *European Planning Studies* 4(4): 379-400. https://doi.org/10.1080/09654319608720354

Autio, E., & Thomas, L. D. W. 2014. Innovation ecosystems: Implications for innovation management?, in Dodgson M., Gann D., Phillips N. (Eds.). *The Oxford Handbook of Innovation Management.* Oxford, UK: Oxford University Press, 204–228.

Aydalot, P. (Ed.) 1986. *Milieux innovateurs en Europe*. Paris: GREMI.

Bahlmann, M. D. 2016. Finding value in geographic diversity through prior experience and knowledge integration: a study of ventures' innovative performance, *Industrial and Corporate Change* 25(4): 573-589. https://doi.org/10.1093/icc/dtv041

Balland, P. A., Boschma, R., & Frenken, K. 2015. Proximity and innovation: From statics to dynamics, *Regional Studies* 49(6): 907-920. https://doi.org/10.1080/00343404.2014.883598

Balog, M. 2016. Development Factors of Cluster Organizations in the Slovak Republic, *EKONOMICKY CASOPIS* 64(2): 149-168.

Becattini, G. 2002. Industrial sectors and industrial districts: Tools for industrial analysis, *European Planning Studies* 10(4): 483-493. https://doi.org/10.1080/09654310220130194

Bellandi, M. 2002. Italian industrial districts: An industrial economics interpretation, *European Planning Studies* 10(4): 425-437. https://doi.org/10.1080/09654310220130158

Bonetto, P., Hofmann, B., Prause, G. 2014. Rise and fall of the Lyon silk cluster: a case study about entrepreneurial sustainability, *Entrepreneurship and Sustainability Issues* 2(1): 1-11. https://doi.org/10.9770/jesi.2014.2(1)

Boschma, R. 2004. Proximité et innovation, *Économie Rurale* 280(1): 8-24.

Boschma, R. 2005a. Proximity and innovation: A critical assessment, *Regional Studies* 39(1): 61-74. https://doi.org/10.1080/0034340052000320887

Boschma, R. 2005b. Role of proximity in interaction and performance: Conceptual and empirical challenges, *Regional Studies* 39(1): 41–45. https://doi.org/10.1080/0034340052000320878

Boschma, R., Balland, P.-A., & de Vaan, M. 2014. The formation of economic networks: A proximity approach, in Torre A., Wallet F. (Eds.). *Regional development and proximity relations*. Cheltenham: Edward Elgar, 243-267.

Boschma, R.A., & Frenken, K. 2010. The spatial evolution of innovation networks. A proximity perspective, in Boschma R. A., Martin R. (Eds.). *Handbook on evolutionary economic geography*. Cheltenham: Edward Elgar, 120-135.

Braczyk, H. J., Cooke, P. N., & Heidenreich, M. (Eds.). 1998. *Regional innovation systems: the role of governances in a globalized world*. Psychology Press.

Broekel, T., & Boschma, R. 2012. Knowledge networks in the Dutch aviation industry: the proximity paradox, *Journal of Economic Geography* 12(2): 409-433. https://doi.org/10.1093/jeg/lbr010

Camagni, R. 1991. Introduction: From the local "milieu" to innovation through cooperation networks, in Camagni R. (Ed.). *Innovation networks: Spatial perspectives*. London: Belhaven Press, 1-9.

Cohen, W. M., & Levinthal, D. A. 1990. Absorptive capacity: A new perspective on learning and innovation, *Administrative Science Quarterly* 35(1): 128–152. doi:10.2307/2393553

Cooke, P. 2001. Regional innovation systems, clusters, and the knowledge economy, *Industrial and Corporate Change* 10(4): 945-974. https://doi.org/10.1093/icc/10.4.945

Courlet, C. 1994. Les systèmes productifs localisés. De quoi parle-t-on?, in Courlet C., Soulage B. (Eds.). *Industrie, territoires et politiques publiques*. Paris: Editions L'Harmattan, 13-32.

Doloreux, D. 2002. What we should know about regional systems of innovation, *Technology in Society* 24(3): 243-263. https://doi.org/10.1016/S0160-791X(02)00007-6

Doloreux, D., & Parto, S. 2005. Regional innovation systems: Current discourse and unresolved issues, *Technology in Society* 27(2): 133-153. https://doi.org/10.1016/j.techsoc.2005.01.002

Dosi, G., & Nelson, R. R. 1994. An introduction to evolutionary theories in economics, *Journal of Evolutionary Economics* 4(3): 153-172. https://doi.org/10.1007/BF01236366

Fitjar, R. D., Huber, F., & Rodríguez-Pose, A. 2016. Not too close, not too far: Testing the Goldilocks principle of 'optimal' distance in innovation networks, *Industry and Innovation* 23(6): 465-487. https://doi.org/10.1080/13662716.2016.1184562

Florida, R. 1995. Toward the learning region, *Futures* 27(5): 527-536.

Gilly, J. P., & Torre, A. 2000. Proximity relations. Elements for an analytical framework, in Green M. B., McNaughton R.B. (Eds.). *Industrial networks and proximity*. Aldershot: Ashgate Publishing, 1-16.

Guerini, M., Bonaccorsi, A., Colombo, M.G., Rossi-Lamastra, C. 2013. The role of geographical, social and cognitive proximity in collaborations between high-tech entrepreneurial ventures and universities. *35th DRUID Celebration Conference*, Barcelona, Spain, June 17–19.

Hair, J. F., Black W. C., Babin B. J., & Anderson R. E. 2014. *Multivariate data analysis* (7th ed.). Harlow UK: Pearson Education Limited.

Hansen, T. 2015. Substitution or overlap? The relations between geographical and non-spatial proximity dimensions in collaborative innovation projects, *Regional Studies* 49(10): 1672-1684. https://doi.org/10.1080/00343404.2013.873120

Hardeman, S., Frenken, K., Nomaler, Ö., & Ter Wal, A. L. 2015. Characterizing and comparing innovation systems by different 'modes' of knowledge production: A proximity approach, *Science and Public Policy* 42(4): 530-548. https://doi.org/10.1093/scipol/scu070

Havierniková, K., Kordoš, M. 2019. Selected risks perceived by SMEs related to sustainable entrepreneurship in case of engagement into cluster cooperation, *Entrepreneurship and Sustainability Issues* 6(4): 1680-1693. https://doi.org/10.9770/jesi.2019.6.4(9)

Heringa, P. W., Horlings, E., van der Zouwen, M., van den Besselaar, P., & van Vierssen, W. 2014. How do dimensions of proximity relate to the outcomes of collaboration? A survey of knowledge-intensive networks in the Dutch water sector, *Economics of Innovation and New Technology* 23(7): 689-716. https://doi.org/10.1080/10438599.2014.882139

Klimas, P. 2011. Wymiary bliskości w sieciach innowacji *Przegląd Organizacji* 4: 16–20.

Klimas, P. 2020. Proximity: Synthesis, Six-Dimensional Typology, and Significance for Cooperation Performance, in *Contemporary Challenges in Cooperation and Coopetition in the Age of Industry 4.0*. Cham: Springer, 243-272

Knoben, J., & Oerlemans, L. A. 2006. Proximity and inter-organizational collaboration: A literature review, *International Journal of Management Reviews* 8(2): 71-89. https://doi.org/10.1111/j.1468-2370.2006.00121.x

Levy, R., & Talbot, D. 2015. Control by proximity: Evidence from the 'Aerospace Valley' competitiveness cluster, *Regional Studies* 49(6): 955-972. https://doi.org/10.1080/00343404.2013.840721

Lindqvist G., Ketels C., & Sölvell Ö. 2013. *The Cluster Initiative Greenbook*. Stockholm: Ivory Tower Publishers.

Lis, A. M. 2019. The significance of proximity in cluster initiatives. *Competitiveness Review: An International Business Journal*, 29(3): 287-310. https://doi.org/10.1108/CR-08-2018-0050

Lis, A. M. 2018. *Współpraca w inicjatywach klastrowych. Rola bliskości w rozwoju powiązań kooperacyjnych [Cooperation in cluster initiatives: the role of proximity in the development of cooperative relationships]*. Gdansk: Wydawnictwo Politechniki Gdanskiej.

Lombardi, M. 2003. The evolution of local production systems: the emergence of the "invisible mind" and the evolutionary pressures towards more visible "minds", *Research Policy* 32(8): 1443-1462. https://doi.org/10.1016/S0048-7333(02)00157-9

Maillat, D. 1998. Innovative milieux and new generations of regional policies, *Entrepreneurship & Regional Development* 10(1): 1-16. https://doi.org/10.1080/08985629800000001

Malmberg, A., & Maskell, P. 1997. Towards an explanation of regional specialization and industry agglomeration, *European Planning Studies* 5(1): 25-41. https://doi.org/10.1080/09654319708720382

Malmberg, A., & Maskell, P. 2006. Localized learning revisited, *Growth and Change* 37(1): 1-18. https://doi.org/10.1111/j.1468-2257.2006.00302.x

Marshall, A. 1890. *Principles of Economics*. London: 8th ed., Macmillan.

Martin, R. 2003. *A study on the factors of regional competitiveness. A final report for the European Commission DG Regional Policy*, Cambridge: University of Cambridge.

Monge, P. R., Rothman, L. W., Eisenberg, E. M., Miller, K. I., & Kirste, K. K. 1985. The dynamics of organizational proximity, *Management Science* 31(9): 1129-1141. https://doi.org/10.1287/mnsc.31.9.1129

Morgan, K. 1997. The learning region: Institutions, innovation and regional renewal, *Regional Studies* 31(5): 491-503. https://doi.org/10.1080/00343400701232322

North, D. C. 1990. *Institutions, institutional change and economic performance*. Cambridge, New York: Cambridge University Press.

Paci, R., Marrocu, E., & Usai, S. 2014. The complementary effects of proximity dimensions on knowledge spillovers, *Spatial Economic Analysis* 9(1): 9-30. https://doi.org/10.1080/17421772.2013.856518

Pavelkova, D., Bednar, P. & Bialic-Davendra, M. 2015, Internationalisation activities of the cluster organisations: factors which influence them, *Transformations in Business & Economics* 14(3C): 416-332.

Petruzzelli, A.M., Albino, V., & Carbonara, N. 2009. External knowledge sources and proximity, *Journal of Knowledge Management* 13(5): 301-318. https://doi.org/10.1108/13673270910988123

Porter, M. E. 1998. Clusters and the new economics of competition, *Harvard Business Review* 76(6): 77–90.

Porter, M. E. 2000. Location, competition and economic development: Local clusters in the global economy, *Economic Development Quarterly* 14(1): 15-31. https://doi.org/10.1177%2F089124240001400105

Porter, M. E. 2008. *On competition*. Harvard Business Press.

Pyke, F., Becattini, G., & Sengenberger, W. (Eds.). 1990. *Industrial districts and inter-firm co-operation in Italy*. International Institute for Labour Studies.

Rallet, A., & Torre, A. 1999. Is geographical proximity necessary in the innovation networks in the era of global economy?, *GeoJournal* 49(4): 373-380. https://doi.org/10.1023/A:1007140329027

Rice, R.E., & Aydin, C. 1991. Attitudes toward new organizational technology: Network proximity as a mechanism for social information processing, *Administrative Science Quarterly* 36(2): 219-44. https://www.jstor.org/stable/2393354

Sforzi, F. 2002. The industrial district and the'new' Italian economic geography, *European Planning Studies* 10(4): 439-447. https://doi.org/10.1080/09654310220130167

Singh, J. 2005. Collaborative networks as determinants of knowledge diffusion patterns, *Management Science* 51(5): 756-770. https://doi.org/10.1287/mnsc.1040.0349

Sölvell, Ö., Lindqvist, G., & Ketels, C. 2003, *The cluster initiative greenbook*. Stockholm: Ivory Tower.

Stam, E. 2007. Why butterflies don't leave: Locational behavior of entrepreneurial firms, *Economic Geography* 83(1): 27-50. https://doi.org/10.1111/j.1944-8287.2007.tb00332.x

Torre, A., & Rallet, A. 2005. Proximity and localization, *Regional Studies* 39(1): 47-59. https://doi.org/10.1080/0034340052000320842

Tremblay, D. G., Fontan, J. M., Klein, J. L., & Rousseau, S. 2003. Proximité territoriale et innovation: une enquête sur la région de Montréal, *Revue dEconomie Regionale Urbaine* (5): 835-852. https://doi.org/10.3917/reru.035.0835

Wuyts, S., Colombo, M. G., Dutta, S., & Nooteboom, B. 2005. Empirical tests of optimal cognitive distance, *Journal of Economic Behavior & Organization* 58(2), 277-302. https://doi.org/10.1016/j.jebo.2004.03.019

Yamada, E., & Kawakami, T. 2015. Assessing dynamic externalities from a cluster perspective: the case of the motor metropolis in Japan, *The Annals of Regional Science* 54(1): 269-298. https://doi.org/10.1007/s00168-014-0654-9

Anna Maria LIS is the Associate Professor at the Gdańsk University of Technology. She is the head of the Department of Industrial Management, Faculty of Economics and Management GUT. Her scientific and research interests have been focused on problems related to institutional forms of support provided for the development of inter-organizational cooperation (including cluster organizations and business environment institutions). She has participated in many research projects implemented at academic centers, as well as in projects requested by the public authorities.
ORCID ID: orcid.org/0000-0002-1527-7796

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

ENTREPRENEURSHIP AND SUSTAINABILITY CENTER

enterprise europe network
Business Support on Your Doorstep

OASPA

Scopus

Web of Science

Publisher
http://jssidoi.org/esc/home

Clarivate Analytics

THE EFFICIENCY OF HOSPITALS: PLATFORM FOR SUSTAINABLE HEALTH CARE SYSTEM[*]

Beata Gavurova [1], Kristina Kocisova [2]

[1] Center for Applied Economic Research, Faculty of Management and Economics, Tomas Bata University in Zlín, Mostní 5139, 76001 Zlín, Czech Republic
[2] Faculty of Economics, Technical University of Košice, Němcovej 32, 042 00 Košice, Slovak Republic

E-mails:[1] gavurova@utb.cz ; [2] kristina.kocisova@tuke.sk

Abstract. Hospitals and other providers of health services are facing enormous pressure to reduce costs while providing better services for patients without lowering their quality. By utilising a two-stage dynamic Data Envelopment Analysis (DEA) approach, we explore whether there is a compromise between the production of services and the quality of services in the process of providing health care at the level of hospitals in Slovakia. While the first stage deals with the production efficiency of the hospitals, the second stage deals with the quality of service using patient-reported safety and satisfaction measures. The efficiency of hospitals in Slovakia is assessed, using hospital-level data from the database of INEKO for the years 2015 and 2018. In order to dynamically analyse the efficiency changes during the analysed period, the Malmquist index was used. The results revealed that overall technical efficiency increased over the analysed period. We can also see an increase within the service production division as well as service quality division. The results obtained represent a significant platform for the creators of health policy at the national level, and for the creators of the strategic regional health plans as a basis of continuous creation of mechanisms that are inevitable for providing a sustainable system of the Slovak health care at the regional level. The global threats of epidemics, such as COVID-19 pandemic, address the question of public health systems' sustainability, which enormously increases.

Keywords: Two-stage dynamic DEA; Service production division; Service quality division; Hospitals; Slovakia

---

1. Introduction

Sustainability of health care system is connected with a research of balance between supply and demand. Efficiency and effectiveness of the health care system represent a possible strategy in resolving the disparities between supply and demand of health care in a publicly funded health care system. It means the production of better health care that is funded by a set budget while preserving the quality of services. Monitoring and evaluation of effectiveness and financial efficiency of the health care system are long-term priorities of senior political representatives, and also of the general public and general population. The entire population, irrespective of age, race, sex and/or nationality is affected by the quality and available health care. Health care and health protection of citizens are enshrined in the constitutions around the world.

Consequently, this area reflects a human's quality of life. These aspects are related to the sustainability of health care systems, which is connected to intense technological development and subsequent increase in costs on health care as well as processes of demographic ageing (Megyesiova, Lieskovska, 2018, 2019). However, there are no concepts of health care systems' sustainability that would be known at the national or international level. It may be related to significant heterogeneity, complex health systems, and many other specificities, such as health policy, government strategies, processes of demographic ageing within a country, regional disparities in morbidity and mortality of the regions within a country, availability of health care, etc. (Bednarova et al. 2013; Bem et al. 2019). Thus, it is necessary to connect health care system sustainability with effectiveness, which may be regionally differentiated. Knowledge of these factors may help the creators of health policy to set appropriate supporting, stabilizing and regulatory mechanisms so, that the differences between regions and health facilities in quality and effectiveness of health care would be as low as possible (Predkiewicz et al. 2019). Also, the question of health system sustainability increases in the context of the COVID-19 pandemic, when the governments have started to search for solutions of providing health care system funding in such a crisis (Androniceanu, 2020).

The study's motivation is all of the above-mentioned coherent facts. It aims to research relationships between the production of services and the quality of services in the process of providing health care at the level of hospitals in Slovakia, and consequently, to evaluate the rate of differences between them.

2. Literature Review

Many international research studies deal with research on factors of health care systems' sustainability. These factors may have a different impact on a population and social systems in the individual countries (Syczygiel et al. 2014; Ucieklak-Jez et al. 2018); Du et al., 2020). For instance, Vandersteegen et al. (2015) researched the impacts of no-fault compensation on health care expenditures in their study, while the authors focused on the OECD countries. Also, this study states that it is essential to improve current medical practice systems, which are a significant factor that determines health care costs, as well as compensation systems in health care. Similarly, the role and influence of responsibility processes in health care are critical. De Meijer et al. (2013) research the factors of costs' division on health care and the impacts of their increase. The structure of their allocation influences the growth rate of health care costs in hospitals. The authors used the Dutch data of real health care costs, hospital registers and mortality databases to perform the research. In the conclusion of their study, the authors emphasize an expected and permanent increase of costs on health care in the hospital sector due to technological development.

Consequently, it should improve treatment, its financing costs and procedural complexity (human resources, infrastructure, etc.). Thus, the sustainability of public health systems becomes the main topic. In the studies of van Baal et al. (2012), Kuca et al. (2015), the authors examine health care system sustainability by means of the analysis of relationships between changes in the mortality rates and costs on health care per person. Also, the authors emphasize that the growth of health care costs per person may significantly depend on age. Karslsberg

Schaffer et al. (2015) state and highlight that the evidence of cost efficiency is rarely used in the local health care expenditure plans. The study results stress the differences in objectives between Health technology assessment (HTA) bodies and local health service decision-makers. Grembowski et al. (2010) researched a relation of the changes in expenditures per capita of local health departments (LHD) to 1990–1997 changes in mortality rates for Black and White racial/ethnic groups in the U.S. The LHD costs were related to absolute reductions in mortality for infants, blacks, and white females. However, these costs did not close black-white mortality differences for these groups. Schofield et al. (2013) examined the impacts on income, taxes, government support payments and GDP due to lost labour force participation. In the conclusion of their study, the authors provide interesting facts: individuals bear the economic costs of lost income in addition to the burden of the condition itself. However, the state impacts include loss of productivity from reduced workforce participation, lost income, taxation revenue, and increasing government support payments - in addition to direct health care costs. These findings are significant for policy creators, who create prevention programs to eliminate morbidity and mortality of the most serious and expensive diseases, because their underestimation may have fatal impacts on finances of health and economic systems of a country. Even Brandle et al. (2016) connect health care system sustainability with an excess capacity of advanced medical technologies in the hospital sector, which influences health care costs' increase. This finding is significant, especially for decentralized structures of health care provision. Consequently, the importance of research efficiency of health care systems in the individual countries is evident and inevitable to setup sustainability strategies of health care systems in the individual countries. Zimon et al. (2016) see possible problem also in the logistic distribution in hospitals, which inhibit to higher health care efficiency.

Our study focuses on the research of hospitals' efficiency in Slovakia, and it aims to research a compromise between the production of services and the quality of services in the process of providing health care at the level of hospitals in Slovakia. The important impact has also health insurance company which achieved a special place among financial institutions, as mentioned by Liberko et al. (2012) Data Envelopment Analysis (DEA) was used in the study. In recent years, this method is also widely used in other research areas, and it contributes to the formation of new modules that reflect on the complexity of decision-making processes. Many research studies evaluate its appropriateness while showing many application possibilities as well as limitations.

Avkiran (1999) points out that DEA is a non-parametric linear programming technique that calculates a comparison ratio of outputs to inputs for each unit, which is reported as a relative efficiency score. The efficiency score is usually expressed as a number between zero and one or 0 and 100%. A decision unit with less than one can be considered as inefficient compared to other units. Luo (2003) states that DEA is a formulation of linear programming that defines a non-parametric relationship between multiple outputs and multiple inputs. It identifies the efficiency frontier, which consists of the most efficient decision-making units (DMU). Efficient DMUs are units for which no other DMU or linear combination of DMUs can generate at least the same number of given outputs. According to Zimková (2014), the non-parametric DEA method makes it possible to create the efficiency frontier and evaluate the efficiency of the DMU. Conventional DEA models are designed to maximise the relative efficiency of each decision unit, provided that the relative efficiency scores obtained in this way for each decision unit are also feasible for all other decision units in the data set. Therefore, both reference points are identified, the relatively efficient units that define the efficiency frontier, as well as the internal points that are below the efficiency frontier. Due to its deterministic nature, the DEA method hypothesises that the DMU causes all deviations from efficiency. Nevertheless, there are some elements, such as the legislative framework, the level of competition, the impact of the crisis, which the company cannot control and which also affects the efficiency of the unit under investigation. According to Palečková (2015), the DEA model can be designed either to minimise inputs or to maximise outputs. Input orientation focuses on reducing the number of inputs while maintaining at least current output levels, while output orientation aims to maximise output levels without increasing input utilisation. The DEA measures the relative efficiency of a homogeneous set of DMUs using multiple inputs to produce multiple outputs. The DEA also identifies the sources and degree of inefficiency for each input and output concerning inefficient DMUs. It provides a means for comparing the efficiency of multiple DMUs to each

other based on multiple inputs or outputs. Saleh & Malkhalifeh (2013) state that DEA has been applied in many studies in various sectors of the economy. Conventional DEA models consider the system to be single-process. However, there are several so-called network approaches, which consider a system to be composed of different processes or phases, each of which has its inputs and outputs and intermediates between the various phases. Two-stage DEA models have higher discriminative power than conventional, single-process DEA. The main disadvantage is the need for more detailed data (i.e. at the process level) and the greater complexity of the resulting models, especially if some inputs or outputs are shared between processes. Ozcan (2014) pointed to the fact that in health care, services are produced by various departments that each contribute to the overall efficiency of the hospital. It is more so for those hospital systems where the individual hospitals and other networks such as physician practices, nursing homes, ambulatory surgery centres, and diagnostic centres may be part of the whole picture. Through the network DEA model, one can observe not only the efficiency of the health care facility but also its sub-unit efficiencies as its components. Network DEA models were first introduced by Fare & Grosskopf (2000), and their models have been extended by Tone & Tsutsui (2009) and others. The network DEA model extended by Lewis & Sexton (2004) presents a multi-stage structure as an extension of the two-stage DEA model. Also, Kao (2017) pointed to the fact that the system is usually composed of many subsystems operating interdependently. Conventional DEA only considers the inputs supplied to and the outputs produced from the system in measuring efficiency, ignoring its internal structure. As a result, the overall system may be efficient, even while all component divisions are not. More significantly, there are cases in which all the component divisions of a DMU have performances that are worse than those of another DMU, and yet the former still has the better system performance. With an eye on solving these problems, many ideas have been extended from the conventional DEA to build models to measure the efficiency of production systems with different network structures, which are referred to as network DEA. Consequently, for systems composed of interrelated divisions, managers need to know how the performances of the various divisions are evaluated and how they are aggregated to form the overall performance of the system. We are also able to analyse the relationship between the efficiency of a system and those of its component divisions when the systems being examined have different types of network structures. This relationship shows the extent to which the efficiency of a division impacts that of the system as a whole. The division with the most significant effect is the one to which more effort should be devoted so that the performance of the overall system can be raised more effectively. Grmanová (2013) says that gradually the need arose to compare the efficiency not only of the whole process but it was also necessary to find out the efficiency of partial processes, into which this whole process is decomposed. It was the reason for the creation of two-stage DEA models. A two-step DEA can be used to evaluate the efficiency of the whole process, but also to examine the effectiveness of sub-processes. The use of a two-stage DEA method makes it possible to examine the effectiveness of each of the two evaluated sub-processes and the product of the efficiency of the subjects in the different sub-processes or whether it is the same as the efficiency of the overall process. According to Chen et al. (2010), the DEA is a method for measuring the effectiveness of DMUs. The DEA has been extended to examine the effectiveness of two-stage processes, where all outputs from the first phase are transitional measures that make up the inputs to the second phase. The resulting two-stage DEA model not only provides an overall efficiency score for the entire process but also provides an efficiency score for each stage. Given the existence of transitional measures, the usual procedure for adjusting inputs or outputs to efficiency points, as in the DEA standard approach, does not necessarily lead to a borderline projection. Also, Mitropoulos (2019) prepared the two-stage DEA model to assess the efficiency of health service delivery. He supposes that within the first stage, we use resources to produce health services as intermediate outcomes. In the second stage, the health services are used to produce final outcomes within the service quality division. These research results emphasize a significance of the DEA model's use also in this analysis in order to achieve the study's aim.

3. Methodology, Variables and Data Collection

We apply a two-stage dynamic DEA model to assess the efficiency of service production division and service quality division. In the first stage, the service production division assesses the utilisation of resources (labour,

physical capital) to produce health services as intermediate outputs. In the second stage, the health services obtained from the service production division are used as inputs to the service quality division to produce final outputs that express the patients´ experiences from hospitals. The conceptual model can be expressed by the following figure (Fig. 1).

In particular, the inputs of the service production division include the number of doctors per hospitalised patient, the number of nurses per hospitalised patient and number of beds per hospitalised patient to satisfy health care for patients. We decide to apply expression per hospitalised patient to eliminate size differences between hospitals. The outputs (intermediate outputs) from this division is expressed by the average length of hospital stay, surgical procedure rate, surgical planning and median waiting time for emergency admission.

The service quality division uses as inputs all the intermediate outputs from the service production division to produce quality and safety health services as expected by patients. The patients´ perceptions of hospitals' quality are assessed by using four satisfaction measures based on the respondents´ ratings of the health care in hospital, the staff access to patients in the hospital, the patient information in hospital, and the hotel services in the analysed hospital. As mentioned by Mitropoulos (2019) the patient safety is an essential issue in health care services. Adverse events, in the process of caregiving, may result from problems in practice, products, procedures or systems.
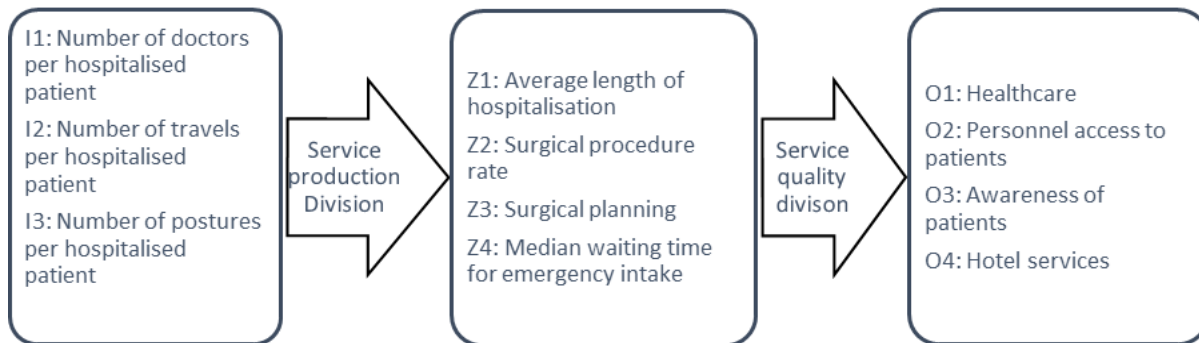
Fig. 1. The two-stage health service delivery process

Source: Prepared by authors

The analysis focuses on assessing the efficiency of the hospitals in Slovakia between 2015 and 2018. Our analysis is done for a sample of 40 hospitals. All variables used in this study are available on an annual basis from the web page www.kdesaliecit.sk prepared by the INEKO. Through this page, the INEKO want to provide objective data and want to draw the public attention to the discussion about the quality and efficiency of medical facilities. If people have more quality information, they can make better decisions and create more effective pressure to improve public services. They want to help the project with patients and their relatives, as well as the facilities themselves. The data come from health insurance companies, Ministry of Health of the Slovak Republic, the Office for Health Care Supervision, the National Centre for Health Information, self-governing regions, Transparency International Slovakia and their analyses. As mentioned by INEKO, some data may be distorted; for example, by the small number of samples and may not correspond to the reality of the device. The complete definition of the health care indicators that are included in the DEA model is available in Table 1.

Table 1. Definition and descriptive statistics of variables included in the DEA model

Indicator	Definition	Min / Max / Average / St.dev
Inputs		
Number of doctors per hospitalised patient	Practicing doctors that provide services for individual patents in hospital; density per 1 hospitalised patient	0.0042 / 0.0356 / 0.0071 / 0.0049
Number of nurses per hospitalised patient	Number of nurses working in hospital; density per 1 hospitalised patient	0.0114 / 0.0542 / 0.0174 / 0.0067
Number of beds per hospitalised patient	Inpatient beds available in hospital; density per 1 hospitalised patient	0.0217 / 0.3124 / 0.0385 / 0.0448
Intermediates		
Average length of hospital stay	Average number of days that patients spend in hospital measured by dividing the total number of days stayed by all inpatients during a year by the number of admissions or discharges	4.2672 / 8.6143 / 6.1100 / 0.9645
Surgical Procedure Rate	The share of operations in the total number of hospitalizations	0.3053 / 0.8280 / 0.6274 / 0.1231
Surgical Planning	It assesses whether only acute cases go to the hospital or whether patients choose it for planned emergency health care themselves.	0.0390 / 0.3211 / 0.1350 / 0.0655
Median waiting time for emergency admission	Median waiting time in minutes	12.15 / 22.40 / 16.77 / 2.59
Outputs		
Health care	Assessment of the patient about the provided health care and improvement of the health condition after discharge from the hospital, on a point scale from 0-5, recalculated to other hospitals	0.6611 / 0.7992 / 0.7251 / 0.0309
Staff access to patients	Assessment of the patient about the time spent by the doctor and the nurses, the availability of consultations with the doctor, on a point scale from 0-5, recalculated to other hospitals	0.6863 / 0.8355 / 0.7660 / 0.0309
Patient information	Assessment of patient information about a diagnosis, clarity of information and patient involvement in decision-making on a point scale of 0-5, recalculated to other hospitals	0.6484 / 0.8094 / 0.7276 / 0.0342
Hotel services	Patient rating on the quality of accommodation, quality of food and quality of cleaning in the hospital on a point scale from 0-5, recalculated to other hospitals	0.5514 / 0.7890 / 0.6481 / 0.0522

Source: Prepared by authors

As all our inputs and outputs are expressed in the form of ratios, it able us to use model under the assumption of constant returns to scale. As mentioned by Jacobs et al. (2006), this is very common in health care. For example, mortality rates, discharge rates, doctors per head of population, nurses per occupied bed, the proportion of expenditure on clinical supplies from total expenditure, proportion of theatre time for hip replacement operations from total theatre time are commonly used measures of input or output. The essential point to note is that the use of such data automatically implies an assumption of constant returns to scale because the creation of the ratio removes any information about the size of the organisation.

We assume a general two-step process, as shown in Fig. 1, for each of a number of n DMUs. We assume that each DMU_j ($j=1,2...,n$) has m inputs x_{ij} ($i=1,2,...,m$) in the first phase and D intermediate outputs z_{dj} ($d=1,2,...,D$) from this stage. These outputs D then become inputs to the second phase and therefore behave as temporary measures. The outputs from the second phase are y_{rj} ($r=1,2,...,s$). In our case, we assume that in the first phase, the goal will be to determine the minimum number of inputs x_{ij} ($i=1,2,...,m$) needed to produce intermediate outputs z_{dj} ($d=1,2,...,D$) from this stage. For this reason, an input-oriented model will be applied in the first phase. As mentioned by Charnes et al. (1978), the input-oriented model under the constant returns to scale assumption (CCR model) for measuring the relative efficiency of DMU can be expressed as follows:

$$EI_0 = \min \theta_0 \tag{1}$$

$$\text{s.t. } \sum_{j=1}^{n} z_{dj}\lambda_j \geq z_{r0} \qquad d = 1,2,...,D \tag{2}$$

$$\sum_{j=1}^{n} x_{ij}\lambda_j \leq \theta_0 x_{i0} \quad i = 1,2,...,m$$

$$\lambda_j \geq 0 \qquad\qquad j = 1,2,...,n$$

In the second phase, the goal will be to determine what maximum number of outputs y_{rj} ($r=1,2,...,s$) the production unit is able to generate from a given number of inputs (intermediate outputs from the first division) z_{dj} ($d=1,2,...,D$). In this case, an output-oriented model will be applied in the second phase.

$$EO_0 = \max \phi_0 \tag{3}$$

$$\text{s.t. } \sum_{j=1}^{n} y_{rj}\lambda_j \geq \phi_0 y_{rq} \qquad r = 1,2,...,s \tag{4}$$

$$\sum_{j=1}^{n} z_{dj}\lambda_j \leq z_{d0} \qquad d = 1,2,...,D$$

$$\lambda_j \geq 0 \qquad\qquad j = 1,2,...,n$$

In the case under investigation, it is assumed that the value of the intermediated variables is the same, whether they are perceived as inputs or outputs. It is possible to apply two separate DEA analyses into two stages, as reported by Seiford & Zhu (1999). The criticism of such an approach is the internal conflict that arises between the two analyses. For example, it assumes that the first stage is efficient, and the second phase is not. When the second stage improves its performance, the change in inputs (intermediate variable) may cause the first stage to be inefficient. It suggests the need for a DEA approach that ensures coordination between the two stages. As mentioned by Liang et al. (2008), it is, therefore, appropriate to define the efficiency of the whole two-stage process as the geometric average of the efficiency of two phases $E_0 = EI_0$ x EO_0.

As we want to compare efficiency between two years, we can calculate the Malmquist index to measure the productivity changes over time. The Malmquist index can be calculated for both divisions, and also the overall Malmquist index. The Malmquist productivity index evaluates a productivity change of a DMU between two periods as the product of "catch-up" and "frontier shift" terms. The catch-up (recovery or efficiency change) term reflects the degree that a DMU attains for improving its efficiency. In contrast, the frontier shift (innovation or technological change) term demonstrates the difference in the efficient frontier surrounding the DMU between the two periods. We obtain the following formula for the computation of the Malmquist index:

$$Malmquist\ Index = \frac{\delta^2((x_0, y_0)^2)}{\delta^1((x_0, y_0)^1)} \times \left[\frac{\delta^1((x_0, y_0)^1)}{\delta^2((x_0, y_0)^1)} \times \frac{\delta^1((x_0, y_0)^2)}{\delta^2((x_0, y_0)^2)}\right]^{1/2} \tag{5}$$

If the "catch-up" effect value is greater than 1, it interprets the progress in the relative efficiency from period 1 to period 2. The "catch-up" effect value equal to 1 indicates no changes in the relative efficiency, and a value below 1 indicates a regress in relative efficiency. The "frontier-shift" higher than 1 indicates progress in the frontier technology around the evaluated production unit from period 1 to period 2, while "frontier-shift" lower than one indicate regress in the frontier technology. The Malmquist index higher than 1 indicates progress in the total factor productivity change of the evaluated production unit, from period 1 to period 2. The Malmquist index equal to 1 shows a status quo, and the Malmquist index lower than one means deterioration in the total factor productivity.

4. Results and Discussion

The efficiency score for service production division, service quality division and the overall hospital efficiency for the 40 Slovak hospitals are presented in Table 2. The average overall efficiency score for all analysed hospitals was 0.8254 in 2015. Twenty-two hospitals achieved a higher level of overall efficiency compared to the average in 2015; four of them were marked as efficient. On the other hand, eighteen hospitals achieved a lower level of overall efficiency compared to the average in 2015. In 2018 the average overall efficiency was 0.8052, where twenty hospitals achieved a higher level of overall efficiency compared to the average in 2018, five of them were marked as efficient, and fifteen hospitals achieved a lower level of overall efficiency compared to the average in 2018. When we look at the efficiencies of divisions, we can see that the average efficiency of service production division was 0.9160 in 2015 and 0.9102 in 2018. In 2015 twenty-five hospitals achieved a higher level of efficiency compared to the average in the service production division, between them fifteen were marked as efficient, and fifteen hospitals achieved a lower level of efficiency compared to the average in the service production division in 2015. In 2018 twenty-two hospitals achieved a higher level of efficiency compared to the average in the service production division, between them eighteen were marked as efficient, and eighteen hospitals achieved a lower level of efficiency compared to the average in the service production division in 2018. In the case of the service quality division, twenty-one hospitals achieved a higher level of efficiency compared to the average in service quality division, between them twelve were marked as efficient, and nineteen hospitals achieved a lower level of efficiency compared to the average in service quality division in 2015. In 2018 nineteen hospitals achieved a higher level of efficiency compared to the average in service quality division, between them twelve were marked as efficient, and twenty-one hospitals achieved a lower level of efficiency compared to the average in service quality division in 2018.

When we compare the level of average efficiency in service production division and service quality division in 2018, we can see that the level of efficiency in of service production division was higher than in the service quality division. The same tendency can be seen in the case of twenty-two hospitals. The opposite tendency can be seen in the case of thirteen hospitals. In the case of five hospitals, the level of efficiency is the same in both divisions. Comparing the results, we can say that hospitals tend to be more efficient within the service production division. To analyse the relationship between two divisions of hospitals, we have calculated the Pearson´s correlation coefficient, which was -0.1298 in 2015 and -0.1378 in 2018. These results indicate a small negative relationship between service production division and service quality division in both years. The results pointed to the fact that synergy existed between these divisions.

Table 2. Efficiency score in divisions and overall efficiency for selected Slovak hospitals in 2015 and 2018

No.	Hospital	Service production division		Service quality division		Overall efficiency	
		2015	2018	2015	2018	2015	2018
1.	F.D. Roosevelt University Hospital in Banská Bystrica	1.0000	0.7977	0.8043	0.8705	0.8043	0.6944
2.	The SNP Central Military Hospital in Ružomberok – teaching hospital	1.0000	1.0000	0.9366	0.8995	0.9366	0.8995
3.	The Martin University Hospital	0.9471	0.9284	0.9869	0.9113	0.9347	0.8460
4.	The University Hospital Nitra	1.0000	1.0000	0.8482	0.7297	0.8482	0.7297
5.	The Ružinov Hospital in Bratislava	0.8336	0.7519	0.8919	0.7439	0.7434	0.5593
6.	J. A. Reimana Teaching Hospital with Polyclinic in Prešov	0.7421	0.8359	0.7754	0.7228	0.5754	0.6042
7.	Teaching Hospital with Polyclinic in Nové Zámky	0.9136	1.0000	0.7758	0.7661	0.7088	0.7661
8.	Faculty Hospital and Polyclinic in Žilina	1.0000	1.0000	0.6815	0.8185	0.6815	0.8185
9.	L. Pasteur University Hospital in Košice	0.8095	0.7408	0.7560	0.8159	0.6120	0.6044
10.	Faculty Hospital in Trenčín	0.7367	1.0000	0.9778	0.7703	0.7204	0.7703
11.	Faculty Hospital in Trnava	0.8131	0.8922	1.0000	0.7912	0.8131	0.7059
12.	Košice-Šaca Hospital, 1ˢᵗ private hospital	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
13.	Hospital in Stará Ľubovňa	1.0000	0.7895	1.0000	1.0000	1.0000	0.7895
14.	The Poprad Hospital	0.8817	1.0000	1.0000	0.9668	0.8817	0.9668
15.	Hospital with Polyclinic in Spišská Nová Ves	1.0000	0.8927	0.8789	0.9788	0.8789	0.8738
16.	Hospital of Dolnáorava with Polyclinic L.N.Jége in Dolný Kubín	0.9415	1.0000	1.0000	1.0000	0.9415	1.0000

No.	Hospital					
17.	Vranov nad Topľou Hospital	0.8832	0.8790	1.0000	1.0000	0.8832	0.8790
18.	Hospital A. Leňa in Humenné	0.9607	0.7916	0.9410	0.8407	0.9040	0.6654
19.	General Hospital with Polyclinic in Lučenec	1.0000	0.9147	0.9617	0.9084	0.9617	0.8309
20.	Hospital of arm. Gen. L. Svoboda Svidník	0.6074	0.8060	0.9677	1.0000	0.5878	0.8060
21.	The Štefan Kukura Hospital and Polyclinic in Michalovce	1.0000	1.0000	0.9620	1.0000	0.9620	1.0000
22.	The Hospital of Alexander Winter in Piešťany	0.8702	0.8283	0.8308	1.0000	0.7230	0.8283
23.	General Hospital in Komárno	1.0000	1.0000	0.8571	0.8604	0.8571	0.8604
24.	Hospital with Polyclinic in Trebišov	0.9454	0.8731	1.0000	0.8772	0.9454	0.7659
25.	Hospital and Polyclinic in Dunajská Streda	0.6771	0.6365	1.0000	1.0000	0.6771	0.6365
26.	Liptovská Hospital and Polyclinic, MD Ivana Stodolu in Liptovský Mikuláš	0.9365	0.9878	1.0000	0.9686	0.9365	0.9567
27.	Faculty Hospital and Polyclinic Skalica	0.8844	1.0000	0.8984	0.9261	0.7945	0.9261
28.	General Hospital with Polyclinic Levoča	0.9670	0.9058	0.9865	0.8095	0.9539	0.7332
29.	St. Jacob's Hospital with Polyclinic in Bardejov	1.0000	1.0000	0.8636	0.7668	0.8636	0.7668
30.	St. Barbara's Hospital with Polyclinic in Rožňava	1.0000	1.0000	0.6744	0.7482	0.6744	0.7482
31.	The and Hospital Polyclinic in Brezno	0.9542	0.9267	0.8903	0.8377	0.8495	0.7762
32.	Hospital in Snina	0.7828	1.0000	1.0000	1.0000	0.7828	1.0000
33.	Kysuce Hospital and Polyclinic, Čadca	1.0000	1.0000	1.0000	0.8319	1.0000	0.8319
34.	Hospital and Polyclinic Považská Bystrica	0.9553	0.8926	0.7458	0.8696	0.7125	0.7762
35.	Hospital and Polyclinic of St. Luke in Galanta	1.0000	1.0000	0.8235	0.8428	0.8235	0.8428
36.	Hospital Zvolen	0.9675	0.8679	0.8733	1.0000	0.8449	0.8679
37.	Hospital and Polyclinic in Myjava	0.8217	0.7776	0.7701	0.8198	0.6328	0.6375
38.	Hospital and Polyclinic in Revúca	0.8714	1.0000	1.0000	1.0000	0.8714	1.0000
39.	Hospital and Polyclinic in Prievidza	0.9375	1.0000	0.7397	0.7531	0.6934	0.7531
40.	Hospital Partizánske	1.0000	0.6906	1.0000	1.0000	1.0000	0.6906
	Average	0.9160	0.9102	0.9025	0.8861	0.8254	0.8052
	Max	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	Min	0.6074	0.6365	0.6744	0.7228	0.5754	0.5593
	St.dev	0.1009	0.1033	0.1025	0.0974	0.1245	0.1200

Source: Prepared by authors

The next part of the paper analyses changes in the efficiencies using the Malmquist index. The overall Malmquist index (MI) can be decomposed in frontier shift (F.S.) effect and catch-up (C.U.) effect. The frontier shift effect represents an improvement in efficiency due to the innovation, while the catch-up effect represents an improvement in efficiency due to improved operations and management of the hospital and also optimisation in terms of size. While the MI, F.S., and CU above 1 indicate the improvement between periods, the values below 1 indicate worsening in the efficiency. The total improvement, respectively, the deterioration can be calculated as the difference between the index value and the number 1. In percentage form, the difference is multiplied by 100.

Table 3. Malmquist index and its components in the Slovak hospitals

No.	Hospital	Service production division			Service quality division			Overall efficiency			
		CU	FS	MI	CU	FS	MI	CU	FS	MI	Rank
1.	F.D. Roosevelt University Hospital in Banská Bystrica	0.6428	1.5200	0.9770	1.0921	1.1807	1.2895	0.7020	1.7946	1.2598	16
2.	The SNP Central Military Hospital in Ružomberok – teaching hospital	1.0985	1.2694	1.3944	0.9447	1.1249	1.0627	1.0378	1.4279	1.4819	5
3.	The Martin University Hospital	1.0284	1.3075	1.3447	0.9481	1.1210	1.0628	0.9750	1.4657	1.4291	6
4.	The University Hospital Nitra	1.0091	1.1519	1.1624	0.8664	1.1576	1.0030	0.8743	1.3335	1.1658	21
5.	The Ružinov Hospital in Bratislava	0.5358	1.0271	0.5503	0.8744	1.1040	0.9653	0.4685	1.1340	0.5313	39
6.	J. A. Reimana Teaching Hospital with Polyclinic in Prešov	1.1814	1.1557	1.3653	0.9172	1.1008	1.0096	1.0835	1.2722	1.3785	10
7.	Teaching Hospital with Polyclinic in Nové Zámky	1.1084	0.9906	1.0980	1.0123	0.9974	1.0097	1.1221	0.9881	1.1087	25
8.	Faculty Hospital and Polyclinic in Žilina	0.9361	1.0291	0.9633	1.2223	0.9427	1.1522	1.1442	0.9701	1.1099	24
9.	L. Pasteur University Hospital in Košice	0.9752	1.5497	1.5113	1.0799	1.0779	1.1640	1.0531	1.6704	1.7592	2
10.	Faculty Hospital in Trenčín	1.6226	0.9791	1.5887	0.7947	1.1132	0.8846	1.2894	1.0900	1.4054	7
11.	Faculty Hospital in Trnava	1.0368	1.1527	1.1952	0.7604	1.0095	0.7677	0.7885	1.1637	0.9175	32
12.	Košice-Šaca Hospital, 1st private hospital	1.0012	1.2465	1.2481	0.9713	1.0846	1.0534	0.9725	1.3519	1.3147	12
13.	Hospital in Stará Ľubovňa	0.7486	1.0915	0.8171	1.0507	1.1151	1.1716	0.7865	1.2171	0.9573	30
14.	The Poprad Hospital	1.2171	1.3215	1.6084	0.8724	1.0656	0.9296	1.0618	1.4082	1.4952	4

15.	Hospital with Polyclinic in Spišská Nová Ves	0.7216	1.1897	0.8584	1.1269	1.2071	1.3603	0.8131	1.4361	1.1677	20
16.	Hospital of Dolnáorava with Polyclinic L.N.Jége in Dolný Kubín	1.1350	1.0567	1.1993	1.0039	0.9363	0.9400	1.1394	0.9894	1.1273	22
17.	Vranov nad Topľou Hospital	0.9569	0.9987	0.9557	0.9458	1.1728	1.1092	0.9050	1.1713	1.0600	26
18.	Hospital A. Leňa in Humenné	0.8223	0.9978	0.8205	0.9233	1.0261	0.9473	0.7592	1.0238	0.7772	35
19.	General Hospital with Polyclinic in Lučenec	0.8243	1.1822	0.9745	0.9614	1.1855	1.1398	0.7925	1.4015	1.1107	23
20.	Hospital of arm. Gen. L. Svoboda Svidník	1.1023	0.9689	1.0679	1.7533	0.7009	1.2289	1.9326	0.6791	1.3124	13
21.	The Štefan Kukura Hospital and Polyclinic in Michalovce	0.9957	0.9808	0.9766	1.1388	0.9409	1.0715	1.1339	0.9229	1.0465	27
22.	The Hospital of Alexander Winter in Piešťany	0.9817	1.2641	1.2410	1.3474	1.0472	1.4111	1.3228	1.3238	1.7511	3
23.	General Hospital in Komárno	1.0770	1.0203	1.0988	1.0613	1.0270	1.0900	1.1430	1.0479	1.1976	19
24.	Hospital with Polyclinic in Trebišov	0.9207	1.2267	1.1294	0.8628	1.2977	1.1196	0.7943	1.5919	1.2645	15
25.	Hospital and Polyclinic in Dunajská Streda	0.6598	0.9893	0.6528	0.9986	0.9940	0.9926	0.6589	0.9833	0.6479	37
26.	Liptovská Hospital and Polyclinic, MD Ivana Stodolu in Liptovský Mikuláš	1.0488	1.0408	1.0916	0.9361	0.8139	0.7619	0.9818	0.8471	0.8317	34
27.	Faculty Hospital and Polyclinic Skalica	1.7015	1.0625	1.8077	1.0322	0.9442	0.9746	1.7562	1.0032	1.7617	1
28.	General Hospital with Polyclinic Levoča	0.8825	1.1694	1.0320	0.8318	1.2140	1.0098	0.7340	1.4196	1.0421	28
29.	St. Jacob's Hospital with Polyclinic in Bardejov	1.0147	1.1314	1.1480	0.9043	1.1864	1.0728	0.9175	1.3423	1.2316	18
30.	St. Barbara's Hospital with Polyclinic in Rožňava	1.0190	1.0456	1.0655	1.1080	1.0898	1.2075	1.1291	1.1395	1.2866	14
31.	The and Hospital Polyclinic in Brezno	0.9553	1.1056	1.0562	0.9519	0.9144	0.8704	0.9093	1.0109	0.9193	31
32.	Hospital in Snina	1.6709	1.0235	1.7101	0.9575	0.8101	0.7756	1.5998	0.8291	1.3264	11
33.	Kysuce Hospital and Polyclinic, Čadca	1.0083	1.0517	1.0605	0.8094	0.7240	0.5860	0.8161	0.7615	0.6214	38
34.	Hospital and Polyclinic Považská Bystrica	0.9345	0.9982	0.9328	1.1376	0.9252	1.0525	1.0630	0.9235	0.9817	29
35.	Hospital and Polyclinic of St. Luke in Galanta	1.0743	1.2121	1.3022	1.0478	1.0297	1.0789	1.1257	1.2481	1.4050	8
36.	Hospital Zvolen	0.8618	0.9410	0.8110	1.1904	0.7236	0.8613	1.0259	0.6809	0.6985	36
37.	Hospital and Polyclinic in Myjava	0.9133	1.1778	1.0757	1.1026	1.0572	1.1656	1.0070	1.2452	1.2539	17
38.	Hospital and Polyclinic in Revúca	1.1927	1.0269	1.2248	0.8586	0.8290	0.7118	1.0241	0.8513	0.8718	33
39.	Hospital and Polyclinic in Prievidza	1.1817	1.0814	1.2779	1.0435	1.0395	1.0847	1.2332	1.1241	1.3861	9
40.	Hospital Partizánske	0.4489	1.0674	0.4792	0.8833	1.0210	0.9019	0.3965	1.0898	0.4321	40
	Average	1.0062	1.1201	1.1219	1.0081	1.0263	1.0263	1.0118	1.1594	1.1457	
	Max	1.7015	1.5497	1.8077	1.7533	1.2977	1.4111	1.9326	1.7946	1.7617	
	Min	0.4489	0.9410	0.4792	0.7604	0.7009	0.5860	0.3965	0.6791	0.4321	
	SD	0.2568	0.1399	0.2867	0.1741	0.1421	0.1707	0.2975	0.2625	0.3186	

Source: Prepared by authors

Table 3 shows the Malmquist index (MI) of each hospital for the overall hospital efficiency, and also for service production division and service quality division. The hospitals are ranked in descending order according to the overall MI. The top-ranking hospital was Faculty Hospital and Polyclinic Skalica (No. 27) with a productivity gain of 76%, while Hospital Partizánske (No. 40) was the lowermost hospital with a productivity loss of 57%. The average productivity growth between two years was 14.57%, and only twelve hospitals exhibited productivity degrees between analysed years. From these hospitals, only four exhibited productivity degrees simultaneously in both divisions. The progress in the overall total factor productivity index was caused by the 1.18% growth in the relative technical efficiency (catch up effect) and positive innovation effect (15.94%) which led to the shift of production possibility frontier. The overall progress was positively influenced by the progress of 12.19% in the case of the service production division and by the progress of 2.63% in service quality division. The progress in the total factor productivity index in case of service production division was caused by the 0.62% growth in the relative technical efficiency and positive innovation effect (12.01%). In the case of service quality division, the progress was caused by the growth in the relative technical efficiency by 0.81% and the positive innovation effect (2.63%). The frontier shift effect representing the impact of innovation was positive in most of the hospitals in both divisions. The catch-up effect was positive in case of both sub-divisions, which represents an improvement in technical efficiency due to improved operations and management of hospitals and optimisation of their optimal size.
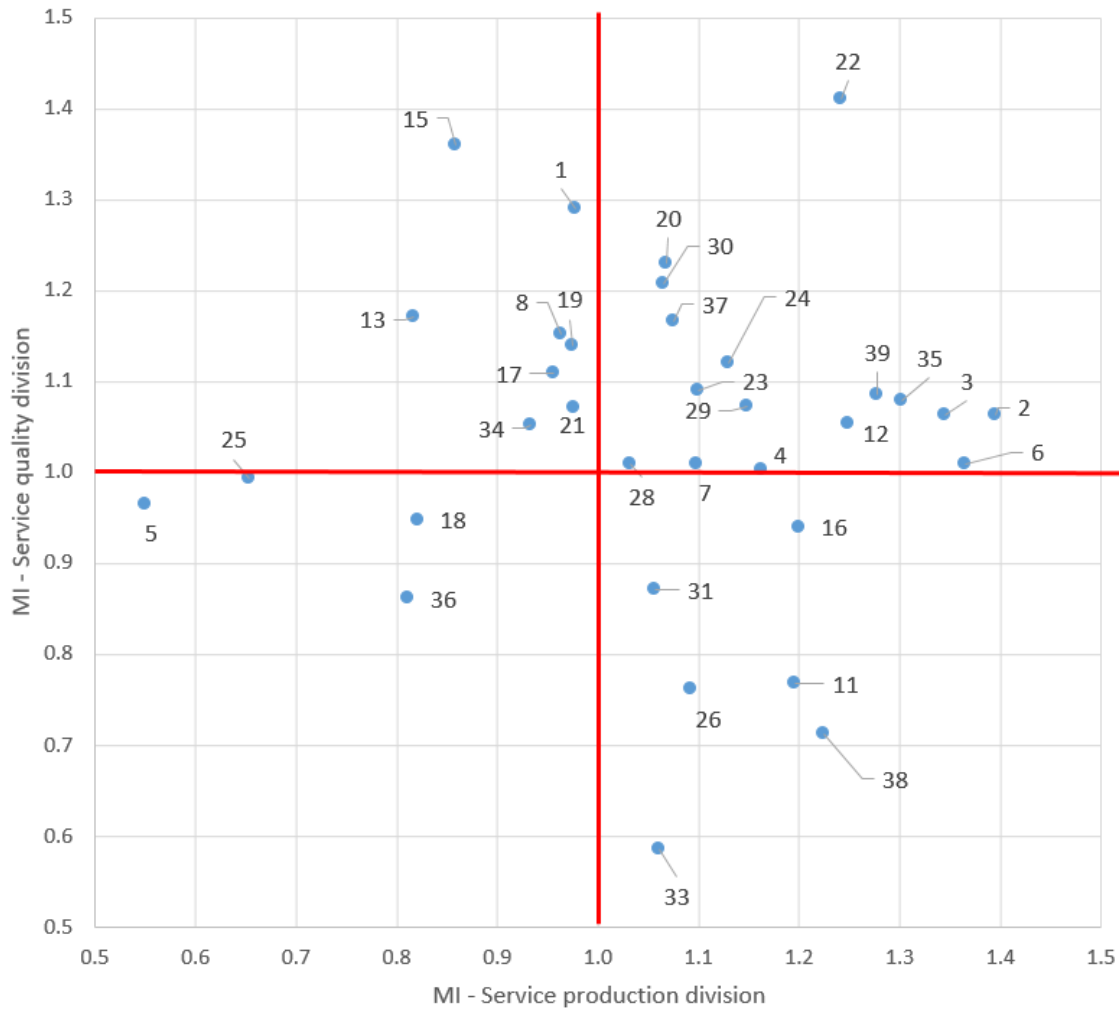
Fig. 2. Malmquist index in divisions

Source: Prepared by authors

From the hospitals that exhibited productivity progress, we can see from Fig. 2 that seventeen hospitals achieved progress in both divisions, and only five hospitals achieved degrees in both divisions. In the case of other hospitals, they were able to achieve progress at least in one division. We can see that ten hospitals achieved progress in service production division and degrees in service quality division, while the situation was opposite in the case of eight hospitals. The Pearson correlation coefficient of the divisional Malmquist indexes has also revealed a small negative relationship (-0.1185) between service production division and service quality division.

Conclusion

Human health is a significant dimension in the evaluation of the population's quality of life. Also, it is a biological characteristic, and it has a significant societal value. Priority of each country is to create the best and functioning health care system that would protect, monitor and especially improve population's health status by means of active and efficient health policy (Marešová et al., 2016). Health care market is characterized by many specificities, while the fundamental economic principles are also applied here. These principles create a space for potential conflicts, as well. It is connected to efforts that satisfy health care demand. However, the budget is

limited. Demographic prognoses and informatization growth demand for health care, while covered by limited financial resources. Sustainability of health care systems is a priority in a short-term and also long-term horizon. The creators of health policy and other stakeholders need to face increasing pressures which result in the implementation of more systematic and effective ways of health care systems' measurement and evaluation in order to improve public health as well as health care, responsibility, management and effective use of resources in health care. Measuring the effectiveness of health systems is a cardinal issue in most of the countries.

The Slovak health care system provides a wide space for inefficiency decrease. The study's subject was all of the facts mentioned above. Its main aim is to examine relationships between the production of services and the quality of services in the process of providing health care at the level of hospitals in Slovakia and subsequently, evaluate the rate of differences between them. The Malmquist index evaluated the total efficiency of each researched hospital. Similarly, efficiency in its two researched divisions, service production division and service quality division, used the same index.

As a consequence of this fact, it is possible to create a scale of hospitals according to their hospital efficiency. The analyses results show significant differences in efficiency among individual hospitals. It will influence a different availability of health care among regions, as well as on a different rate of patients' satisfaction. Also, this rate will influence differences in health care demand within regions, and subsequently, it will influence a deepening of the regional disparities in health. The study's results provide a valuable platform for the creation of national and regional strategic health plans, whose aim is to eliminate disparities in health in the individual regions. Thus, these plans may create mechanisms for providing a sustainable health care system in Slovakia. The question of public health systems' sustainability enormously increases even in the context of the global threats of epidemics, such as COVID-19 pandemic.

References

Androniceanu, A. (2020). Major structural changes in the E.U. policies due to the problems and risks caused by COVID-19. Administratie si Management Public, 34, 137–149. https://doi.org/10.24818/amp/2020.34-08

Avkiran, N. K. (1999). An application reference for data envelopment analysis in branch banking: Helping the novice researcher. International Journal of Bank Marketing, 17(5), 206–220. https://doi.org/10.1108/02652329910292675

Bednárová, L., Pacana, A., Chovancova, J. (2013). Environmental information as a key to solve a problem with polluted territories, Ecology, economics, education and legislation: conference proceedings, volume II: 13th international multidisciplinary scientific geoconference SGEM 2013, 135–140.

Bem, A., Siedlecki, R., Predkiewicz, P., Gazzola, P., Ryszawska, B., Ucieklak-Jez, P. (2019). Hospitals' Financial Health in Rural and Urban Areas in Poland: Does It Ensure Sustainability? Sustainability, 11(7), 1932. https://doi.org/10.3390/su11071932

Braendle, T., Colombier, C. (2016). What drives public health care expenditure growth? Evidence from Swiss cantons, 1970–2012. Health Policy, 120(9), 1051–1060. https://doi.org/10.1016/j.healthpol.2016.07.009

De Meijer, C., O'Donnell, O., Koopmanschapa, M., van Doorslaer, E. (2012). Health expenditure growth: Looking beyond the average through decomposition of the full distribution, Journal of Health Economics, 32(1), 88–105. https://doi.org/10.1016/j.jhealeco.2012.10.009

Du, J., Peng, S., Song, W., Peng, J. (2020). Relationship between Enterprise Technological Diversification and Technology Innovation Performance: Moderating Role of Internal Resources and External Environment Dynamics, Transformations in Business & Economics, 19, (2(50)), 52-73.

Fare, R., & Grosskopf, S. (2000). Network DEA. Socio-Economic Planning Sciences, 34(1), 35–49.

Grembowski, D., Bekemeier, B., Conrad, D., Kreuter, W. (2010). Are local health department expenditures related to racial disparities in mortality? Social Science & Medicine, 71(12), 2057–2065. https://doi.org/10.1016/j.socscimed.2010.09.004

Grmanová, E. (2013). Aplikácia dvojstupňovej DEA metódy pri hodnotení efektívnosti poisťovní a bánk. Trends Economics and Management, 16, 7.

Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the efficiency of decision making units. European Journal of Operational Research, 2(6), 429–444.

Chen, Y., Cook, W. D., & Zhu, J. (2010). Deriving the DEA frontier for two-stage processes. European Journal of Operational Research, 202(1), 138–142. https://doi.org/10.1016/j.ejor.2009.05.012

Jacobs, R., Smith, P. C., & Street, A. (2006). Measuring Efficiency in Health Care: Analytic Techniques and Health Policy. https://books.google.sk/books?hl=sk&lr=&id=SdE0CV6XazkC&oi=fnd&pg=PA1&dq=%22Measuring+Efficiency+in+Health+Care%22&ots=kOEfjeWX9r&sig=_kypqe2mOSrYN7V9PFrUDDNDYvg&redir_esc=y#v=onepage&q=%22Measuring%20Efficiency%20in%20Health%20Care%22&f=false

Kao, C. (2017). Network data envelopment analysis. Springer, 10, 26–33.

Karlsberg Schaffer, S., Sussex, J., Devlin, N., Walker, A., (2015). Local health care expenditure plans and their opportunity costs. Health Policy, 119(9), 1237–1244. https://doi.org/10.1016/j.healthpol.2015.07.007

Kuca, K., Mohelska, H., Maresova, P., Valis, M. (2015). Alzheimer's disease and its treatment costs: Case study in the Czech Republic. Neuropsychiatric Disease and Treatment, 2349. https://doi.org/10.2147/ndt.s87503

Lewis, H. F., & Sexton, T. R. (2004). Network DEA: Efficiency analysis of organizations with complex internal structure. Computers & Operations Research, 31(9), 1365–1410. https://doi.org/10.1016/S0305-0548(03)00095-9

Liang, L., Cook, W. D., & Zhu, J. (2008). DEA models for two-stage processes: Game approach and efficiency decomposition. Naval Research Logistics (NRL), 55(7), 643–653. https://doi.org/10.1002/nav.20308

Liberko, I., Bednárová., L., Šíra, E. (2012) Selected approach for evaluation of best commerce insurance company on Slovak republic market, Nová ekonomika: vedecký časopis, 5(2), 71-79.

Luo, X. (2003). Evaluating the profitability and marketability efficiency of large banks: An application of data envelopment analysis. Journal of Business Research, 56(8), 627–635. https://doi.org/10.1016/S0148-2963(01)00293-4

Marešová, P., Klímová, B., Vališ, M., Kuča, K., Mohelská, H. (2016). Treatment costs of Parkinson's disease in Central Europe. E+M Ekonomie a Management, 19(3), 31-39. https://doi.org/10.15240/tul/001/2016-3-003

Megyesiova, S., Lieskovska, V. Analysis of the Sustainable Development Indicators in the OECD Countries. Sustainability, 2018, 10, 4554, https://doi.org/10.3390/su10124554

Megyesiova, S., Lieskovska, V. (2019). Premature Mortality for Chronic Diseases in the E.U. Member States. Int. J. Environ. Res. Public Health, 2019, 16, 4021. https://doi.org/10.3390/ijerph16204021

Mitropoulos, P. (2019). Production and quality performance of healthcare services in E.U. countries during the economic crisis. Operational Research, 1–17. https://doi.org/10.1007/s12351-019-00483-3

Ozcan, Y. A. (2014). Advanced DEA Models. In Y. A. Ozcan (Ed.). Health Care Benchmarking and Performance Evaluation: An Assessment using Data Envelopment Analysis (DEA), pp. 121–137. Springer US. https://doi.org/10.1007/978-1-4899-7472-3_8

Palečková, I. (2015). Banking efficiency in the Czech Republic and Slovakia using the DEA Window Analysis. In Working Papers (No. 0012; Working Papers). Silesian University, School of Business Administration. https://ideas.repec.org/p/opa/wpaper/0012.html

Predkiewicz, P., Bem, A., Ucieklak-Jez, P. et al. (2019). Public or Private? Which Source of Financing Helps to Achieve Higher Health System Efficiency? 4th Wroclaw International Conference in Finance held at the Location: Wroclaw Univ Econ, Wroclaw, 26-27. 9.2018, Contemporary Trends and Challenges in Finance, Springer Proceedings in Business and Economics, 2019, pp. 191-199.

Saleh, H., Malkhalifeh, R. M. (2013). Performance Evaluation in Bank Branch with Two-Stage DEA Model. 1(11), 17–33.

Seiford, L. M., Zhu, J. (1999). Profitability and Marketability of the Top 55 U.S. Commercial Banks. Management Science, 45(9), 1270–1288. https://doi.org/10.1287/mnsc.45.9.1270

Schofield, D., Shrestha, R., Percival, R., Passey, M., Callander, E., Kelly, S. (2013). The personal and national costs of CVD: Impacts on income, taxes, government support payments and GDP due to lost labour force participation. International Journal of Cardiology, 166(1), 68-71. https://doi.org/10.1016/j.ijcard.2011.09.066

Syczygiel, N., Rutkowska-Podolowska, M., Michalski, G. (2014). Information and Communication Technologies in Healthcare: Still Innovation or Reality? Innovative and Entrepreneurial Value-creating Approach in Healthcare Management. CERS 2014: 5th Central European Conference in Regional Science, International Conference Proceedings, 2015, pp. 1020–1029.

Tone, K., & Tsutsui, M. (2009). Network DEA: A slacks-based measure approach. European Journal of Operational Research, 197(1), 243–252. https://doi.org/10.1016/j.ejor.2008.05.027

Ucieklak-Jez, P., Bem, A., Siedlecki, R. et al. (2018). Concentration of Hospital Infrastructural Resources as a Source of Inequalities in Access to Health Care Benefits in Poland. In: Finance and Sustainability Conference Location: Wroclaw, 2017, Finance and Sustainability Book Series: Springer Proceedings in Business and Economics, 2018, pp. 1–10.

Vandersteegen, T., Cleemput, I., Vereeck, L. (2015). Health Policy, 119(3), 367-374. https://doi.org/10.1016/j.healthpol.2014.09.010

Van Baal, P. H., Wong, A. (2012). Time to death and the forecasting of macro-level health care expenditures: Some further considerations. Journal of Health Economics, 31(6), 976887. https://doi.org/10.1016/j.jhealeco.2012.08.003

Zimková, E. (2014). Technical Efficiency and Super-efficiency of the Banking Sector in Slovakia. Procedia Economics and Finance, 12, 780–787. https://doi.org/10.1016/S2212-5671(14)00405-5

Zimon, D., Gajewska, T., Bednarova, L. (2016). An Influence of Quality Management System for Improvement of Logistics Distribution, Quality-Accessto to Success, 17(155), 68–70.

Prof. Beata GAVUROVA, Ph.D. is an expert in finance, financial analysis and financial risk management. She focuses in her research work on issues of measurement and performance management in various sectors, process management and process optimization, strategic and performance benchmarking. Her dominant research area is the development and testing in the management and performance measurement, the evaluation of methodologies and the preparation of an application platform for innovative management and performance measurement with the support of ICT. She led several national projects, has participated in many international projects targeting the innovative applications of ICT in the private and public sector. **ORCID ID**: https://orcid.org/0000-0002-0606-879X

Assoc. Prof. Kristina KOCISOVA, PhD. is the Associated Professor at Faculty of Economics, Technical University of Kosice. Her research interests: application of Data Envelopment Analysis to measure efficiency in different sectors of the national economy, analysis of different aspects of the banking sector. **ORCID ID**: https://orcid.org/0000-0003-0784-441X

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:
@Entrepr69728810

Publisher
http://jssidoi.org/esc/home

EGYPT BEYOND COVID 19, THE BEST AND THE WORST-CASE SCENARIOS[*]

Mohamed Ramadan A. Rezk [1], Leonardo Piccinetti [2*], Amr Radwan [3], Nahed M. Salem [4], Mahmoud M. Sakr [5], Anas Khasawneh [6]

[1,3,4,5] *Academy of Scientific Research and Technology (ASRT), 101 Elkasr Alini St, 11516, Cairo, Egypt*
[2,6] *Europe for Business Ltd, Warrington, United Kingdom*

E-mails: [1] *mramadan79@gmail.com,* [2*] *l.piccinetti@e4business.eu (Corresponding author);* [3] *radwan.amro@gmail.com;*
[4] *nahedelashkar.asrt@gmail.com;* [5] *msakr@asrt.sci.eg;* [6] *anas.efb@gmail.com*

Abstract. The Coronavirus SARS-CoV-2 (COVID-19) pandemic caused a global substantial effect whilst affecting local healthcare systems and productive sectors among many others. It was a "wake up call" for the economy (investors), policymakers (governments) and the entire society. Progressively, it became widely obvious there is no "going back to normal" and a new normal will gradually be in place. Many questions were raised in this uncertainty situation including how this new normal will affect productive sectors? How can countries leverage the new realities forced on them by COVID-19 to shape better future plans or to achieve their pre-identified goals efficiently? In the middle of this global chaos, are their opportunities for developing economies? This paper tries to answer these questions with specific emphasis on Egypt using foresighting tools while highlighting the best-case and worst-case scenarios for Egypt in the post-COVID-19 world.

Keywords: COVID-19; impact, economy; policymakers; society; scenarious, Egypt

---

1. Introduction

By beginning of December 2019, several cases of pneumonia of unknown etiology were reported in Wuhan, Hubei province, China (Huang C et al., 2020). This was later officially named coronavirus disease 2019 (COVID-19) by the World Health Organization (WHO). Very quickly, COVID-19 had been classified as a global pandemic. As of May 21, 2020, COVID-19 pandemic has affected about 5 million people and claimed over 328,471deaths globally (Johns Hopkins, 2020).

The rapid spread of COVID-19 has basically halted the global economy. It has inflicted high, and rising, human costs worldwide given that that the necessary protection measures severely impacted economic activity. This had severe impact on the livelihoods of many millions of people especially in economies with large percentages of daily wage earners. As a result of the pandemic, the global economy is projected to contract sharply by 3% in 2020. (World Economic Outlook, 2020). While scientists are feverishly seeking vaccines and cures, policymakers are desperately working to implement market, monetary and financial measures targeting the market to support locally affected families and companies. The health, economic, social, and political impact of this pandemic have changed the world as we know it and will push everyone to re-evaluate their priorities and build new alliances.

COVID-19 has already had a severe impact on the health system, scientific research, food energy environment, financial, tourism, sports as well religious practices. Impact has been by and large negative but, in every field, there appears to be new opportunities opening from this negative starting point for the post-COVID world.

In education, most countries closed schools, colleges, and universities to reduce contact and save lives. Teaching, like many businesses, moved online, on an untested and unprecedented scale. Many student assessments also moved online while others were forced into using project work for assessment, with a lot of trial and error and uncertainty for everyone (Simon & Hans, 2020). However, on the positive side, it has been a great transformation leading to popularization of the use of technology in education that can lead to a complete revaluation of the modes of learning and assessment.

As countries went into lockdown, most industrial activities shut down globally including commercial aerospace, travel, apparel, luxury, automotive industries, and insurance. The crisis has also amplified existing challenges by millions of workers all over the world who are facing the prospect of losing their jobs (Abhijit et al,2020). However, it has also catapulted the idea of work for home and will lead to a transformation of the work culture.

Transport is one of the most hard-hit sectors due to lockdown. Road and air transport came to a halt as people were not allowed or hesitated to travel. According to official reports, air travel dropped by 96% due to COVID-19: the lowest in 75 years (CNN, 2020). COVID-19 will require a complete transformation of the airline business. It will surely force people to reconsider their mode of transportation and result in a total transformation of airline and tourism industry. Egypt, like the rest of the world, closed airports and restricted travel excluding only the return of Egyptians from abroad.

While COVID-19 has had a severe negative impact on human lives and the global economy, it has had an unexpected positive impact on the environment and climate change and sustainability. Air pollution levels have dropped significantly due to limited social and economic activities (Dutheil et al., 2020). NASA Satellite images of the northeastern part of United States, showed that CO_2 emission concentration in March 2020 dropped by up to 30% due to lockdown, compared to March 2015 to 2019 (NASA, 2020). This unexpected positive change alongside the realization of the fragility of our civilization has restored the belief that indeed, something can and

must be done about global warming replacing the sense of inevitability that was prevailing before COVID-19. There is no question that the COVID-19 experience will energize the drive for the protection of the environment in the post COVID world.

In the recent years, the world saw a rise in nationalism and isolationist policies pushing for individualism in dealing with global challenges like climate change for example. COVID-19 was a grim reminder that the best of health care systems and strongest economies are not a protection from pandemics and what hit one country, quickly resonated around the world. Most nations quickly learned that fighting the pandemic requires collaboration amongst medical experts to find cure and vaccine as fast as possible. Coronavirus CAN represent an opportunity to review how humanity can work together beyond national boundaries to face common challenges. (Mohamed and Dunya, 2020).

Based on all the above we argue that while COVID's massive disruption of the world order as we know it has been devastating, it presents the possibility of a fresh starting point for the world. There is no "going back to normal". The world will establish "a new normal". Countries who attempt to simply return to business as usual face serious negative consequences as the world is no longer what it was. Those who will emerge successfully from the COVID-19 devastation are the ones who recognize that the governing rules, constraints, and opportunities have completely changed, and everything must be reassessed. This necessitates new foresighting exercise to envision the plausible scenarios for the future depending on how the world reacts to the new drivers shaping the post-COVID-19. The question is what will that new normal be?

Since the start of foresighting with Shell Corporation in the energy sector, its use has spread widely. Governments and corporations have conducted foresight studies to better plan technology-related investments (Reger, 2001), to prepare for potential bioterrorism attacks, and to envision the impact of global warming.

Foresight goes hand in hand with future studies and is closely associated with scenario-building (IPTS, http://forlearn.jrc.ec.europa.eu/index.htm). Recently, we saw more reliance on future studies to prepare for the future (Rezk, et al, 2019). The purpose of a foresight project is as much for helping today's decision-making as it is for creating awareness about tomorrow's challenges and opportunities through building detailed scenarios of alternative plausible futures along with what must be in place to make them happen.

Scenario planning is an increasingly applied strategic process in a variety of contexts (Amer, Daim, & Jetter, 2013; Chermack, 2017; Varum & Melo, 2010). Because of the applied nature of scenario planning, it has grown into a standard practice for most organizations and many countries (Amer, Daim, & Jetter, 2013; Varum & Melo, 2010). Recently, many scenarios were developed for the world post COVID-19 (Mohamed and Dunya, 2020). Most have focused on the "health aspects" with the driving factors being the discovery of vaccines. Many others developed scenarios based on the economy rebounding very slowly, fast or intermittently as a result of the vaccine availability. The recovery effort would require several strategies. Looking at the pre-COVID-19 environment, it is clear that momentum has already increased around the need for a framework reset; several leading companies have stepped up and invested in this revolutionary direction, while innovative government agencies have put forward significant legislative initiatives to allow the transition. (Jocelyn Blériot, 2020).

This paper presents a foresighting exercise to provide alternatives for the future of Egypt in this new post-COVID-19 global context through best case and worst case scenarios intended to help politicians capture the emerging post COVID-19 opportunities and shape a future that was difficult to envision before COVID-19.

We assume that a vaccine is available, and the health aspects of the crisis are under control. The paper focuses on a select set of areas to highlight the opportunities to build a better post corona world and the huge losses if these opportunities are not captured.

2. Methodology

In this paper, we follow the standard approach of writing two archetypes scenarios (Hunt et al., 2012): the best case scenario and worst case scenario. We start with defining the key drivers that affect the future of Egypt through the perspective of specific selected sectors. The scenarios are built by interlinked interaction among these drivers. Both scenarios start from assumptions of availability of vaccines and reasonable economic recovery.

2.1. Defining Key Drivers of Uncertainty

We start with identifying the drivers shaping the future to construct the best and worst scenarios. In this context, the drivers are classified into internal and external drivers that could influence the future of selected sectors (Table 1). The listed drivers incorporate national and international trends for the world after COVID-19.

Table 1. Internal and External drivers for Egypt in the post COVID-19 world

Internal drivers	External drivers
National political leadership action	Changes in world leadership
Centralization of services and state control	Global collaboration on global challenges
State surveillance	Geopolitics
Culture and social attitudes	Globalism vs nationalism
Social, economic and development priorities	Global priorities
Social cohesion	Freedom of movement
Focus on public health and healthcare	Interest in tourism
Technological innovation and R&D investment	Investments, external funds,
Information and communication infrastructure	Diversification of sources/supply chains
Scale of technology adoption	Technological innovation
Digitalization of services	Data protection/sharing globally
Data protection	Workforce culture, automation
Workforce culture	Efficiency vs resilience
Institutional agility to cope with the dynamic changes and uncertainty	Economic recovery
	Vaccine availability
Economic recovery	
Vaccine availability	

2.2 Building of Archetypes Scenarios

Most scenarios already available on the international scene focus on alternative plausible futures for the world depending on early availability of vaccines versus late availability, on virus mutation and on no availability of vaccines or alternative scenarios based on economic assumptions and focused on economic recovery (Deloitte, 2020).

In this paper, the best case scenario (The rainbow after the rain) describes the future if everything lined up perfectly while the worst case scenarios (When the sun never rose again) describes the future if no effort was made to leverage the opportunities created by COVID-19 and Egypt continues business as usual where it left off before Corona as the world moves to the new normal Drivers are incorporated in each scenario.

2. Results and discussion

In this paper, we assume that a vaccine will be available on a wide scale by the end of the year and that the economy will be recovering at a reasonable rate. Our focus is on capturing the opportunities in this post-COVID-19 world as a direct consequence of the transformations that were never before imaginable while focusing on Egypt as a case study. Capturing these opportunities might inform future strategies and policymaking processes to design actions and interventions that better suit the new realities. Ignoring these opportunities and returning to "normal" in a world that is no longer "normal" might not just miss opportunities but rather result in significant deterioration and negative impact on existing plans. The scenarios focus on a select number of fields as examples to drive the idea of capturing post COVID-19 opportunities. Next level would be a more detailed analysis by experts in each field.

3.1. Best Case Scenario "The rainbow after the rain"

When Covid-19 hit, it brought the world to almost a standstill. Hospitals were overwhelmed, and people were dying. Those who were not sick were terrified of becoming infected. Borders around the world were closed. Air traffic came near to a complete shutdown. Universities, schools and factories shut down across the globe. Oil and gas consumption and their price crashed. Stores, gyms, restaurants and businesses closed. People were laid off, and stock markets plunged.

However, at the same time, wars slowed down. Pollution decreased in clearly visible ways. Nature started healing itself. People started getting together to help one another. Poorer countries were helping rich countries. People discovered online technologies could achieve that much in personal and professional communication as well as education. Families started spending more time physically together. A new world was born with a new order and new rules for a new normal. The world recognized that its complete dependence on China for all its manufactured products was a fundamental mistake that endangered lives of millions of people around the world. This was an essential reminder of the necessity of diversifying sources of essential commodities. Governments were reminded of the vital importance of investing in health and a new reality of "working from home" was suddenly the norm.

The Egyptian government was quick to understand that there is no going back to the world before Covid-19. While ministries focused on dealing with the pandemic to stop its spread amongst Egyptians, the government coordinated several thinktanks to plan for the new realities post -Covid-19 based on the lessons learned across nations. Work started on best positioning of Egypt for the world post-Corona even before the pandemic was under control (IDSC, 2020).

3.1.1. Health

COVID-19 shock resulted in a complete re-evaluation of priorities. Public health is now a top priority from both a medical and an economic perspective when it was realized that stopping the spread of a disease is a much more effective strategy than dealing with the resulting morbidity. The economic value of public health is now a critical parameter in government decisions. Massive campaigns have been initiated to instil the culture of prevention of disease, healthy eating and living. People became much more receptive to such messaging when they realized that the majority COVID-19 deaths occurred in people with pre-existing chronic diseases. Smoking, high consumption of sugar and saturated fats became socially frowned upon, and consumption dropped significantly. Walking and cycling are now the more practical choices, especially that new cities had better planning for bikers and walkers. Sidewalks are clear of coffee shops ad other obstacles and Egyptians have since adopted a lifestyle that includes exercise as a preventative health measure. The government reassessed its food rations to the

vulnerable groups to ensure their nutritious value and additional taxes were imposed on "junk food" to further discourage their consumption. Egyptians instinctively understood the risk of the multiplying effect of chronic diseases, like diabetes and hypertension, on their exposure to death and are now much more health conscious.
Covid-19 taught the world a huge lesson about the importance of prevention of infection in hospitals and protection of hospital staff and other patients. Following the pandemic, the Egyptian government continued to impose a strict culture of infection control across its hospitals with the full support of healthcare workers who understood clearly that this is for their safety not just that of the patients. Infection control governing healthcare professionals working across hospitals are strictly now in place to stop the infection transmission.

The threat caused by pre-existing health conditions and the importance of knowing what they are to determine the COVID-19 treatment resulted in a major push for personalized medicine. As part of the health insurance system that was being introduced in stages, Egypt now has a personal electronic file for every public insurance patient accessible from every public health provider. This ensures a far much better health care system. It is also driving a national database for all patients.

During the extended period of partial lockdown, many physicians closed their clinics severely limiting access to healthcare while patients hesitated a lot before seeking healthcare except for real emergencies. Meanwhile, other doctors came together and volunteered to offer free general online advice. This was extremely welcomed by many and was the beginning of the transformation. Now, many physicians have online group presence through which they provide basic simple medical advice to patients at much reduced prices but allowing quick access to professionals for the simple cases that may not need physical presence. This was the catalyst that opened the door to todays' world of telemedicine serving remote areas as well as basic needs.
COVID-19 also raised the issue of cleanliness and disinfection across the country as the armed forces scrambled to disinfect buildings and streets. Sanitation and disinfection of all public places is now a standard required procedure post-COVID-19.

Waste collectors are now issued gloves for their safety as well as tools to allow them to clean the sites without exposing them to disease effectively. The whole idea of the virus surviving on surfaces required a severe re-evaluation of the safety of the food supply in Egypt, mainly food sold on the street. On a related issue, what happened during the peak of COVID-19 with people hording any medicine or vitamin rumoured to be useful in its treatment has driven the Egyptian Ministry of Health to reconsider public access to medication without a doctor's prescription. While the current system still does allow some access without a prescription to simple medications in recognition of the reality in Egypt, the list of restricted medications has been greatly expanded to break the culture of unnecessary consumption or hording of medicine.

Most importantly, today in Egypt National Security now includes Health Security at the same level of importance as food security and water security. This includes having a national stockpile of medicine and critical hospital equipment to cover the nation for a set number of months just as there is a nationwide inventory of food and water. This also includes a stockpile of raw materials needed for local manufacturing of strategic health security products.

3.1.2. Industry

On the industry side, the world reassessed its past focus on efficiency. Resilience, self sufficiency or at least diversification of sources in the supply chain became the new priority. It was clear that as the world scrambles to diversify its sources for products and to break its now-dangerous dependence on China, opportunities will open for countries centrally located like Egypt to step in and be an important node in the newly established network of manufacturing hubs. Egypt's location, central to both Europe and Africa gave it a natural advantage. This

opportunity was made more likely to turn into reality as Chinese businesspeople were keen to ensure they retain their market share and as such, were quite interested in opening up factories for their products outside of China. This started with announcements for SAMSUNG in late May about expanding their facilities and product line being manufactured in Egypt. Many other industry giants quickly followed suit. The government did exceptional effort to facilitate their entry into Egypt resulting in a huge boost to Egyptian industry. Made in Egypt is now a trusted brand across Middle East, Africa, and Europe (Daily news Egypt, 2020).

COVID-19, as well as the government action to attract Chinese and other manufacturers to Egypt, did not just push the industry forward, but it had a transformative impact on scientific research and innovation. While the Covid-19 crisis pushed local innovators to produce face protectors, respirators, and applications to help in tracing contacts, one factor was critical in driving applied research in Egypt. The government required all factories opening up in Egypt to invest a small percentage of their profit on research and development of their products in Egypt through the collaboration of the Egyptian branch of their business with their other branches and with Egyptian researchers. This had a transformative impact driving applied research in Egypt and leading other industries to do the same. As a result, Egypt is now a global competitor in many products not just manufactured in Egypt but also designed in Egypt.

3.1.3 Education

When it came to Education, the abrupt closure of schools and universities thrust everyone into the world of online learning. In Egypt, private schools moved into it instantaneously which was not surprising, but the big surprise was that the public-school system followed very soon after. Given that the ministry was pushing hard in that direction against significant opposition of the change, the Covid-19 imposed closure was a massive boost to the Ministry's efforts. It was an incredible moment of transformation that was seized to drive a complete overhaul of pre-university education at a pace never dreamt of. COVID also forced the acceptance of projects as an evaluation tool in public schools. This was a transformative cultural change that was maintained later as a critical component of the evaluation leading to the current education system. Egypt now has a system that expects and supports independent learning of its students and assesses them on their ability to learn as opposed what was the norm of assessing them on the basis of what they memorized. The transformation that people assumed would take 12 years to complete starting from Grade 1 is now in place after barely two years. COVID-19 eliminated the opposition and opened the way for what is now looked at as a historic transformation.

University education was settled in traditional learning modes and was not as ready to integrate online delivery as pre-university education was. Professors had to arrange for their online delivery in their own independent ways and to choose means of assessment to end the first term in 2020 (except for final years). However, the Supreme Council of Universities acted fast during the summer of 2020 to build on this dramatic change that happened in both university and pe-university education. A high-level committee was put together to explore ways of improving the quality of learning using this technological experience developed so quickly during the pandemic as well as accepted means of assessing learning. When classes returned in Fall 2020, there was no going back, and Egyptian universities had developed a blended learning model where technology is used extensively to invite global experts in live sessions, students learned independently and the lecture time is used for more in-depth discussions, case studies or working out examples. In a word, the classroom is now "inverted" and the learning is "blended".   Course evaluation systematically included independent research projects as well as video presentations. In short, the pandemic resulted in breaking all the barriers that slowed down the inevitable transformation in university education and opened up massive opportunities for independent, high-quality blended learning where the teachers became mentors guiding the learning process and students were expected to "learn to learn" by researching the material themselves.

3.1.4. Workplace Culture

Amongst the traditions destroyed by COVID-19, workplace culture was right at the top. Hundreds of millions around the world were forced to work from home conducting the most massive experiment to assess the good and the bad of such experience. The government in Egypt quickly imposed a stay at home or work from home ruling for its employees except those designated as essential workers. The value of existing online government services was obvious. Banks advertised new ways to complete transactions online. Phone companies provided incentives for using online services. Just as the fear of technology in education was broken, it was also broken in work cultures in private companies as well as the government.

Following COVID-19 many government departments realized the value of allowing employees to work from home. Work from home is now accepted with the added transformative benefit that employees are now assessed based on productivity and not on attendance.

The reduction in the capacity of government workers during the quarantine time highlighted the excess employment in government services. Many of these services continued with those designated as "essential". This caused a significant re-evaluation of the number of employees needed in each department. Attractive severance packages were offered to people to retire/resign and many took them up. In some areas with excess capacity and limited work options, employees were given choices of reduced work week with proportional cutback in salary. This option was welcomed by many lower middle-class women eager to spend time at home.

At the same time, the government opened the door for redistribution of workers where they may be required, with necessary retraining. The government also announced a competition for new initiatives. Those proposing new initiatives were allowed to take a leave from their positions to lead the realization of their initiatives and to recruit others from within the government labour force. This resulted in a complete "reimagination" of government and utilization of its extra capacity to provide expanded more friendly services with minimal overhead.

Currently, the government has moved much more aggressively to drive the painfully slowly moving e-government as citizens were significantly more willing to adapt now that they are more comfortable with technology and more fearful of crowded places. This change has been instrumental not only in modernizing the workforce and services but in curtailing corruption across government and streamlining its services.

The private sector was even more innovative in its approach embracing work from home were possible and establishing the blended week principle where employees worked from home 3 days a week and had to come in only two days a week.

A side benefit this dramatic change in workplace culture and in university/school education had was a really positive unexpected impact on the environment through reducing transportation to and from work while it significantly improved family ties as people now have grown to expect/demand family time.

3.1.5. Informal sector

A significant component of daily wage earners was no longer able to get any employment opportunity as the quarantine was established. The government was swift to recognize the need to provide emergency financial support for them. This highlighted the absence of economic sustainability for a large segment of Egyptian society. As a result, the government put in place a "Pensions for all" initiative to allow daily workers to contribute to a small pension fund with generous interest rates provided the funds are not withdrawn before the age of 60. Participation in this fund also made these wage earners eligible for emergency government assistance in times of need. This initiative was welcomed by over a million people. It started a shift amongst Egyptians to a culture of

planning for the future rather than living day-to-day and then needing complete government assistance in old age. Those who chose to participate in pension planning were included in a database that was used by companies to search for skilled workers. Workers were rated by their employers which improved their opportunities of being hired by other companies in permanent positions.

On the social level, the system put in place during quarantine led to the respect of specific working hours for stores and coffee shops as well as significant improvements in "social order" in using lineups for example at busy stores. The government succeeded in maintaining these limits on store hours after the quarantine was lifted, resulting in a significant reduction in electricity consumption and more importantly increased family time.

3.1.6. Environment

COVID-19 brought the world to a crawl. It was almost like nature was fed up with the excessive pollution in the world and was tired of global warming and decided to force a stop. This temporary stop in industrial activities and transportation showed clear evidence of nature being able to heal itself much faster than was believed possible just prior to COVOD-19. The ozone layer fixed itself, and the hole of the arctic has closed! By the end of April, the quality of air in Egypt improved by 40%. (CAMS, 2020)

This resulted in a renewed resolve globally to protect the environment as we push for sustainable development. Here in Egypt, driven by an increased awareness of the social and economic value of public health, this caused a significant overhaul of the system of enforcement of environmental controls in all sectors. It also strengthened the government's resolve to decrease Egypt's dependence on fossil fuels and increase the percentage of renewable energy produced and waste. Laws were passed to ensure new cities were designed to require solar energy production and minimize energy consumption and to rely more on public transportation. Pre-university education ensured children understood the importance of caring for the environment, and university education challenged students to come up with environmental innovations that can be manufactured locally. Special funding was made available for changes that can improve compliance with environmental regulations.

3.2. Worst Case Scenario "When the sun never rose again''

When COVID-19 hit, it brought the world to almost a standstill. Hospitals were overwhelmed. People were dying. Those who were not sick were terrified of becoming infected. Borders around the world were closed. Air traffic came near to a complete shutdown. Universities, schools, and factories shut down across the globe. Oil and gas consumption and their price crashed. Stores, gyms, restaurants, and businesses closed. People were laid off, and stock markets plunged. Divorce rates increased as families were forced to spend more time together than they ever did and there was a marked increase in domestic abuse. Unemployment skyrocketed, businesses declared bankruptcies and the world was turned upside down. Suddenly, the western countries regarded as invincible were extremely vulnerable and unable to protect the lives of their people or protect their ability to work and earn a living. Third world countries, whose health acre systems were fragile to start with, were left to fend for themselves against the virus and the culture of the people that made its spread much more likely and its treatment a lot less likely to be successful. The geopolitical scene changed dramatically and globalization, which was once an opportunity, was now seen as a threat to both global economy and global health.

A new world was born with a new order and new rules for a new normal. And Egypt was not ready for the change.

The Egyptian government was overwhelmed by the immediate health and economic devastating impact of COVID-19. As it worked on minimizing loss of life and restoring the economy back on the positive track it was following, the terrorism threat remained a top priority requiring significant attention and investment. At the same

time, retaining the state of social rest in the face of internal forces itching for reasons to recreate uprisings was always the overriding constraint. This limited the government willingness to take drastic actions needed for long term growth in this new world and forced a strategy of "avoidance" of change that may create unrest. Once the spread of the virus was somewhat under control, the government was completely focused on going back to the where things were before Covid-19, resuming its original plans with a lot less resources and avoiding any changes that may upset citizens already under significant economic hardship.

3.2.1. Health

The government of Egypt took on the treatment of all COVID-19 case at the government expense. This was a massive unexpected cost at a difficult time when the government trying to rebuild the country's infrastructure, provide social security to its most marginalized, create job opportunities, ensure security, reimagine education and other ambitious projects. It was also coupled with a complete stop in tourism revenue and massive drop in remittances from Egyptians abroad. This huge health cost drain on the already battered budget ended up adversely affecting future investment in the health sector that was had already used up funds originally targeted to other areas.

This was complicated by the fact that Egypt fared much better than ever expected regarding number of deaths compared to western countries of similar size. No scientific explanation existed or was sought as to why Egypt and Africa in general was not as devastated as was initially assumed. Instead, many "theories" have existed and were tacitly accepted about certain vaccinations, the weather, pollution, diet, genes and others. At the end, it was the general belief of most Egyptians that "God takes care of Egypt and will always do". In a very strange way, surviving a huge scale COVID-19 devastation resulted in a belief in "natural immunity" and more disregard for public health, sanitation, food safety or healthy lifestyles on both the individual and government sides. After initially arguing "we must work hard to not repeat the Italian scenario", the prevailing belief was "The Italian scenario can never be repeated here" and people's relaxed attitude towards public health, infection control and other issues became even more relaxed. Given that the government made no effort to understand the reasons behind the relatively limited devastation in Egypt, they made little effort to correct this dangerous public perception.

As the harsh economic environment post COVID-19 reality settled in, the government, keen on avoiding social unrest, was quick to increase the food rations for the marginalized. However, it was unwilling to risk upsetting people by using the opportunity to introduce healthier food options and continued the tradition of including more of "sugar and oil" ensuring the continued unhealthy diet for most needy Egyptians and as such the continued spread of chronic diseases like Diabetes. Such diseases are now so common that they have become accepted as unavoidable part of life. Patients of such diseases continue to overload the system making it impossible to improve the quality of heath care especially given the reduced post-COVID investment in health. Egypt was solidly in a closed cycle of poor public health and nutrition leading to more sick people draining the system more leaving it unable to address long term issues of public health, nutrition or healthy lifestyles.

This deterioration of health care services was exasperated by doctors raising their fees in an effort to make up for lost revenue in the time of Corona and as usual, such increased fees were never later reduced leaving many patients unable to access basic health care. The online medical services that sprouted during COVID-19 continued in a completely unregulated form resulting in significant medical malpractice preying on people unable to access doctors because of their very high fees.

While at one point before COVID, Egypt had started to move slowly towards transformation of its health care system, COVID totally derailed the plans and Egypt is now in much worse shape that it was before.

3.2.2. Industry

Prior to COVID-19, the Egyptian government had long term plans for reviving Egyptian industry. As soon as there was some control on the virus, the government went back to continue where it left off focusing on the exact same areas in its efforts to revive local industry. However, the world had changed. The Egyptian economy like all economies was hit hard and the government had limited resources to invest. It was also much harder to attract foreign investment as the markets had changed dramatically with the world's focus on diversifying from China's hold on manufacturing and the original plans of Egypt did not fit the investors new goals. While investors were keen on investing in areas that help Europe and Africa reduce their dependency on China, Egypt continues pushing its predetermined areas for investment. Investors chose to go where they can address the new needs of the market leaving Egypt empty handed.

While efforts to push local production continue, these are simple incremental efforts that seem ineffective as the world has rearranged its manufacturing priorities. Jordan, Morocco and Alegria captured the opportunities for industrial growth in ways they never could have captured had they been competing with Egypt.

Factories can barely stay operational and need significant government support. They are focused on local market which is not sufficient to allow for growth and to create enough jobs. Unemployment is at unprecedented high levels and foreign currency is at unprecedented low levels resulting in difficulties in importing raw material and consequently further complicating life for industry.

Given that industry is suffering greatly, there is no interest in supporting scientific research and not even product development as businesses go back to survival mode as in post 2011. Egypt's competitiveness continues to deteriorate and as it becomes harder to attract investors or market products, industry's interest in innovation or even development continues to dwindle as businesses are preoccupied with daily challenges. The field of innovation and entrepreneurship which was on a high growth rate track is now practically non-existent.

3.2.3. Education

It seemed the pre-university education sector was the most prepared to handle the COVID-19 crisis of school closing given that the ministry was pushing hard for technology-assisted learning prior to Corona. While indeed, the whole system switched to using online education tools, this transformation did not last long, and the ministry was not able to capture the spirit of the change imposed on the system. Teachers refused to accept change to blended learning and worked to disrupt the system. Parents tired of home schooling were unable to appreciate the importance of independent learning or value of projects in place of exams. They were convinced they had more control on results of exams based on memorization. Private tutors eager to re-establish their business and convinced they make higher profit through in person classes managed to re-establish their hold on the learning market. Even private schools were eager to return to normal" to justify their higher fees. While they all acted independently, they were all united in opposition. The government was too concerned about the social unrest that might erupt by antagonizing such broad sectors of society and they caved in. As quickly as everyone turned to online education, everyone turned back to business as usual with the ministry succeeding in only incrementally moving for expanded use of technology aids to learning and reform of learning objectives. This resulted in the waste of significant funds invested in technology as teachers and parents kept pressuring for old fashioned learning resulting in Egypt continuing to fail its young people by not preparing them for the new world were independent learning using technology had become the norm. Egyptian graduates are now further back on world ranking than they ever were making university education even harder and reducing Egyptian graduates' chances of competing regionally and internationally.

University education was already settled in traditional learning modes and was not as ready to integrate online delivery as pre-university education was. While professors did manage to find online ways to finish the year and based their assessment on group projects, everyone was very eager to go back to their comfort zone as the new academic year started. The Supreme Council of Universities was relieved that the crisis was over and went back "to normal" seeing no reason to change. Students were very anxious about evaluation systems requiring them to learn independently and while they complained about spoon feeding, they quickly realized they can study easier and guarantee grades better in such a system.

Today, as the world moved on to adopt independent learning on a previously unimaginable scale, Egyptian universities continue in "teaching" rather than creating an environment for "independent learning". Students continue to "study for the exam" to maximize grades with no interest in actual learning. The learning environment continues to be based on memorization and as such does not sustain any innovation or creativity. The world that technology opens for learning remains foreign to most Egyptian graduates impacting not only their university learning but their ability to continue learning after graduation.

This has had a very negative impact of the Egyptian workforce as that resistance to technology in education spilled into the workplace. It also had a severe impact of the competitiveness of the Egyptian graduate abroad. Egypt is no longer a key source of advanced skills regionally. This inability to compete regionally left all graduates looking for jobs at home and not finding much. Unemployment has skyrocketed and entrepreneurship disappeared. With a government keen on avoiding social unrest, this resulted in increased support for poverty as opposed to long term initiatives to create employment to break the poverty cycle.

3.2.4. Workplace Culture

COVID-19 forced a sudden and almost complete stay at home/work from home rule on government and private businesses.   There was considerable hope for a complete overhaul of the government workforce post COVID-19 to determine who is deemed essential and who can continue to work from home reducing traffic and crowding and allowing more efficiency. However, to allow people to work from home, there had to be a mechanism that measures performance based on productivity as opposed to simply physical attendance. There was a brief attempt to put such a system in place but given the massive opposition developed to it, it was dropped. People who were used to attendance being fundamentally the main work requirement were too concerned about productivity assessment and how it will be applied. They realized it will require more work from them and may indicate that they are dispensable and in principle did not trust its fairness. The opposition was very strong and the work required for a complete new assessment system was significant enough that the government ended up dropping the proposal, again to avoid potential unrest caused by 6 million disgruntled government employees and their families. Work culture went "back to normal".

However, as a consequence of the success to block renewal of the workplace, those opposing change were energized to further slow down the already slow progress of e-government. All hopes for use of e-government to stop corruption by separating the user from the employee faded. As the world moved on to a complete overhaul of services and went online facilitating access and making corruption basically impossible; Egypt ended up with a strengthened traditional workforce and more deeply rooted every day corruption. This caused significant frustration to Egyptian citizens fuelling their sense of helplessness and anger at the government seeding discontent and at the same time requiring other government concessions to avoid unrest.

On the private sector side, work-from-home culture continued for a while on a hesitant basis. While the companies tried to make it the norm wherever possible, the overall social culture was very resistant to change and work from home continues to be the exception.

3.2.5. Informal sector

After the hit taken by the informal sector, the focus was on returning these daily wage earners to earning their living. The fact that the government and the civil society and generous individuals stepped in to help removed the urgency of long-term planning. The government focused on creating temporary jobs for this class of workers and the focus of workers was on restoring their ability to earn enough daily. This kept a large segment of society living in a very vulnerable state and continued the culture of dependence on the government as the saviour. Indeed, the quick intervention of the government in case of COVID-19 raised the expectations for future interventions. The assumption now is that in times of economic difficulty, the government must step in and if it did not, social unrest will result. This added a sizeable drain on the economy specifically given that there is no way of verifying whose income was really affected and whose income was not. The size of the informal sector is so huge that abuse of government support for those in need is quite easy and again, hesitation to block abusers in fear of social unrest resulted in significant waste of government funds. The newly developed sense of dependence of the informal sector on government coupled with energized forces opposing change in government, education and other areas lead to a paralyzed government that chose to go back to the concept of general subsidy for everyone to avoid social unrest. That was a massive blow to the structural economic changes the government had been working on successfully pre-COVID-19.

On the social level, following the hours of operation limitations imposed during the quarantine; there was a pent-up interest in socializing for both operators of cafes and restaurants and their customers resulting in total chaos in times of operations as well as illegal use of street space for offering services. Streets of Egypt and the big cities became more like slum cities with cafes and street vendors popping up on every street and street corner and taking over sidewalks. The police were totally drained in policing quarantine and as such after quarantine was lifted, they turned a blind eye to violations allowing exponential growth. This drove pedestrians to simply move to the streets competing with cars, slowing down traffic and causing more accidents. Despite the significant investments to restore Egypt's grandeur and impose rules and structure on the streets pre-COVID-19, Egypt's major cities are now more like slums and the government gave up on applying its own regulations.

3.2.6. Environment

When the COVID-19 pandemic hit, it was expected that it would ravage through Africa specifically given the density of population, the widespread existence of chronic conditions and the poor state of healthcare compared to western countries. However, it soon became apparent that reality was the exact opposite. While of course there was a significant impact economically as well as in terms of deaths and load on healthcare systems, Africa in general and Egypt survived with relatively lower number of deaths. As scientists worked on understanding what happened, all kinds of social media theories spread. In particular, one theory that gained credibility was a combination of religious belief that God was looking out for Egyptians in particular and that the pollution in the air is what weakened the virus and slowed down its spread. While this was never an official position, it led to a strengthened culture of inaction on environment and tacit belief that pollution is not so bad after all.

As the world moved aggressively towards retaining and driving the improvement in environment brought about by the COVID shutdown, Egypt moved in the opposite direction opening its doors to "dirty industry" as a desperate attempt to create jobs. The quality of air in Egypt is now recognized internationally as one of the worst. This has had an added devastating effect on tourism and tourists who were now more health conscious avoided travelling to Egypt as well as on the health of Egyptians overwhelming a sector that is barely keeping up.

4. Recommendations:

A. Political leadership accept the principle of there being no "normal" to go back to. A new world order is in place now.
B. Fast and quick action based on freedom from past assumptions about what can work and what cannot work and preparedness to control forces trying to go back to business as usual.
C. Government, businesses, NGOs and citizens identify and capture the new opportunities created by the world's determination to ensure resilience rather than efficiency.
D. Government, businesses, NGOs and citizens identify and capture the new opportunities created after established cultural norms have been decimated during quarantine.

5. Conclusions

COVID-19 has certainly been a wake-up moment for the world. Some countries understood the "no going back to normal" reality while others were exhausted fighting COVID-19 that they barely had enough energy to go back to the old normal; and they were doomed. In this paper, we present best- and worst-case scenarios for the case of Egypt hoping these scenarios would alert decision makers to the incredible opportunities Egypt has in a post COVID-19 world and the disaster that will follow if these opportunities are missed.

References

Amer, M., Daim, T. U., & Jetter, A. 2013. A review of scenario planning. *Futures*, 46, 23-40. https://doi.org/10.1016/j.futures.2012.10.003

Blériot, J. 2020. The COVID-19 recovery requires a resilient circular economy, International Institutions & Governments, Ellen MacArthur

Foundation https://medium.com/circulatenews/the-covid-19-recovery-requires-a-resilient-circular-economy-e385a3690037

Buheji, M., Ahmed, D. 2020. Foresight of Coronavirus (COVID-19) Opportunities for a Better World. *American Journal of Economics*, 10(2), 97-108, https://doi.org/10.5923/j.economics.20201002.05

CAMS, European Centre for Medium-Range Weather Forecasts. April 2020. https://atmosphere.copernicus.eu/cams-tracks-record-breaking-arctic-ozone-hole

Chermack, T.J. (2017). Foundations of Scenario Planning: The Story of Pierre Wack. Routledge. https://www.taylorfrancis.com/books/9781315641232

CNN, 2020. https://edition.cnn.com/2020/04/09/politics/airline-passengers-decline/index.html

Daily news Egypt. 2020. www.dailynewssegypt.com/2020/06/03/samsung-to-invest-84m-over-5-years-in-egyptian-market/

Deloitte. 2020. The world remade by COVID-19, Planning Scenarios for resilient leaders, (https://www2.deloitte.com)

Dutheil, F., Baker, S.J., Navel, V., 2020. COVID-19 as a factor influencing air pollution? Environmental Pollution https://doi.org/10.1016/j.envpol.2020.114466

Hopkins, J. Track Reported Cases of COVID-19 Coronavirus Resource Center, (2020) https://coronavirus.jhu.edu/

Huang. C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y. et al. 2020. Clinical features of patients infected with 2019 novel coronavirus in

Wuhan, China. *The Lancet*, 395(10223), 497-506. https://doi.org/10.1016/S0140-6736(20)30183-5

IDSC, Restarting the economy, June 2020, Volume 2 https://www.idsc.gov.eg/IDSC/DocumentLibrary/View.aspx?id=4102

IPTS (is one of the scientific institutes of the European Commission's Joint Research Centre, JRC), http://forlearn.jrc.ec.europa.eu/index.htm

Mitra, A., Chaudhuri, T.R., Mitra, A., Pramanick, P., Zaman, S. 2020. Impact of COVID-19 related shutdown on atmospheric carbon dioxide level in the city of Kolkata. *Parana Journal of Science and Education (PJSE)*, 6(3), 84-92. ISSN: 2447-6153.

NASA, 2020. https://earthobservatory.nasa.gov/images

Rezk, M. R., Radwan, A., Salem, N. M., Sakr, M. M., Tvaronavičienė, M. 2019. Foresight for sustainable energy policy in Egypt: results from a Delphi survey. *Insights into Regional Development,* 1(4), 357-369. https://doi.org/10.9770/ird.2019.1.4(6)

.

Acknowledgements

European Research Council
Established by the European Commission

Mohamed Ramadan A. REZK
ORCID ID: https://orcid.org/0000-0002-7677-3072

Leonardo PICCINETTI
ORCID ID: https://orcid.org/0000-0002-7861-5668

Amr RADWAN
ORCID ID: https://orcid.org/0000-0002-5567-6708

Nahed M. SALEM
ORCID ID: https://orcid.org/0000-0003-3536-8502

Mahmoud M. Sakr
ORCID ID: https://orcid.org/0000-0001-9467-9250

Anas KHASAWNEH
ORCID ID: https://orcid.org/0000-0001-5693-2542

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:
@Entrepr69728810

SHAPING A COMPREHENSIVE GOVERNMENT-SUPPORTED COUNTRY BRAND PROGRAM*

Victoria V. Perskaya [1], Bari G. Khairov [2*], Nikolay S. Revenko [3], Saida M. Khairova [4]

[1,2,3] Financial University under the Government of the Russian Federation, 49 Leningradsky Prospekt, Moscow, 125993, Russia
[4] Siberian State Automobile and Highway University, 5 Prospekt Mira, Omsk, 644080, Russia

E-mail: [2] bari.khairov@yandex.ru (Corresponding author)*

Abstract. Country brand support programs are instruments of open protectionism, which results from unilateral sanctions by foreign countries or acts as a mechanism for direct government support of national producers, creating positive perception by customers abroad and promoting goods and services to foreign markets. However, the long-term preservation of protectionist measures in the national economy leads to the loss of competitiveness by producers and the national economy as a whole. Therefore, it becomes relevant to study the programs of several states in the context of the development of national production and exports, and search for approaches to shaping a comprehensive program of government support for the country brands, which correspond to the main fair competition features in the global economy based on agreements within the WTO. This study is aimed at identifying the feasibility of transforming the "Made in Russia" initiative into a comprehensive country brand government support program. The methodological tools of the studied problem are based on expert and mutual assessments, the Delphi method, mathematical statistics, and graphical modeling. The expert assessment method was used to substantiate the expediency of protectionism for domestic producers to preserve quality and environmental friendliness of export-oriented products in the current conditions that contribute to cultivating the country's positive image. A cause-and-effect diagram (the so-called Fishbone Diagram) developed on the basis of the K. Ishikawa model made it possible to identify the main causes and conditions for shaping a comprehensive program for the country brand government support.

Keywords: country brand; protectionism; government support; national producer; competitiveness; comprehensive program; fair competition

---

1. Introduction

As a rule, the development of national brand support programs, as evidenced by the world practice, is subordinated to two interrelated tasks: national economy restructuring and implementing strategic national tasks related to long-term development and increasing the international competitiveness of domestically manufactured products (Mahrinasari, 2019; Chowdhury, Sanjoy, 2020).

In macroeconomic terms, global financial instability and violation of the fair competition rules in the world economy is a prominent issue (Posen, 2018; Vasiljeva, 2012). In accordance with the global trends, exportability of products is not considered a priority, because programs are auxiliary tools that make goal setting more sound by combining tools to support production and promote the export of products and services into a single complex. In the studies of Szakonyi (2019), the exportability of goods is determined by the quality of the delivered products and price competitiveness rather than by the formation of certain preferences because of the product country-of-origin effect.

According to Workman (2020), the Russian Federation's economy in 2017-2018 had a stable indicator (26.2%) in terms of the export quota, which practically ensured its invulnerability from external factors. In 2017-2018 the geography of exported Russian goods and services was characterized as follows: approximately 54.5% were delivered to European countries; 36.8% to Asia, 3.8% to Africa, 3.4% to North America and 1.2% to Latin America and the Caribbean, excluding Mexico. By 2025, the value of exports is expected to increase to USD 500 billion, including non-resource exports that will make up to USD 200 billion (Knobel, 2018).

The "Made in Russia" initiative to promote Russian goods and brands abroad is designed to confirm fair practices of domestic manufacturers and their reliability as a supplier of quality products. In this regard, the "Made in Russia" provides a general indication of the quality and environmental friendliness of the product. A positive perception of product brands and companies cultivates a strong image of the country, positively influencing consumers' purchasing decision (Kapustina et al., 2017, p. 2).

In brand support programs, the development goals and the transformation of the national economy structure are subordinated to national interests, which entails limitation of the rules of the World Trade Organization (WTO) in terms of promoting the liberalization of the national economy, which directly contradicts the provisions of fair competition for a number of product groups and service sectors in the global economy based on agreements within the WTO.

Vinogradov et al. (2019, pp. 38–39) devoted their research to the issues of trade and economic barriers, and they noted the opposite effect of the sanctions and restrictions imposed by initiating countries. While Bown (2017, p. 1) emphasized losses for "innocent" trading partners. According to Campbell (2018), such decisions resulted in an increase in the value of the importing companies and at the same time the prices for their products, which led to an increase in the cost of certain types of finished products.

According to the authors, it is advisable to provide a combination of short-term and long-term export promotion policies, including the harmonization of domestic and foreign trade policy tools. In the United States, for example, the primary goal of such a program was to create an environment within the country that promoted the consumption of goods and services produced domestically, and only afterwards it acquired the features of facilitating the transfer of real production from abroad to the U.S. In India, this program, along with all tools to support small and medium-sized entrepreneurs, is primarily aimed at creating a sustainable domestic market for

the consumption of domestically manufactured goods and services, and at implementing the task of intra-economic circulation of goods and services between different states of the country. There is no single integrated "Made in Russia" program in the Russian Federation, but industry-specific government programs have been developed that have priority for the Russia's national economy and for economic positioning the country on the global stage.

When comparing consumer preferences for chocolate both in Russia and abroad (Dityashova, 2016), quality, customer awareness (including information indicated on the packaging), authenticity, safety, consumer novelty, image, and consumption price all play significant roles. This study was aimed at identifying effective industry-specific government programs that do not violate the foundations of fair competition in the global economy.

The purpose of the present study is to identify the feasibility of transforming the "Made in Russia" initiative into a comprehensive program to support the country brand. To achieve this goal, it is necessary to solve the following tasks:
- to analyze the positions of the leading countries in relation to brand support programs;
- to identify methods for the formation of versatile tools for implementing the "Made in Russia" initiative;
- to justify the application of governmental protectionist measures under uncertainty in the external environment when exporting products, provided the WTO rules are adhered to;
- to develop a model for the formation of a comprehensive government-supported country brand program aimed at achieving a leading position in international competition.

While conducting the research, statistical data of surveys and empirical studies of scholars, government and marketing agencies were used. The formulated hypothesis of justified protectionism with government support for the country brand was one of the research results for the purposes of achieving liberal values based on compliance with the WTO rules.

The study is original since for the first time it has substantiated the need for protectionist measures in the form of government support for domestic producers of export-oriented products and the implementation of industry-specific programs to achieve the required level of quality and environmental friendliness in accordance with the WTO rules. These measures will make it possible to create a positive perception for the country brand, and to launch a comprehensive brand support program.

To achieve the objectives of the study, the production and export support programs applied in China, the USA and India were analyzed. The authors assessed the competitiveness of Russian goods and services depending on the product country-of-origin effect and the possibilities of using umbrella brands as a factor in promoting Russian products to foreign markets. The effects of the formation of sustainable preferences for Russian products were identified, and proposals were formulated with regard to the formation of versatile tools for implementing the "Made in Russia" initiative. The proposed cause-and-effect model for developing a comprehensive country brand support program will allow it to be adapted to the requirements of improving the national structural policy in the real sector, and achieving leadership in international competition.

Expert and mutual assessments, the Delphi method, mathematical statistics, and graphical modeling methods were employed in this research.

This analysis determined that the "Made in Russia" initiative is essentially an exclusive umbrella brand, and the development of a comprehensive program is necessary for the systemic governmental support. The elaborated cause-and-effect diagram of the structural-logical model to select conditions for the formation of the government-

supported country brand program is of practical importance for the systematization of industry-specific programs to avoid violations of the foundations of fair competition, to solve the structural adjustment problems for the national economy, and to increase the international competitiveness of products manufactured in the country.

2. Literature review

Since the 1990s a discussion has unfolded: some researchers recognize that the product country-of-origin effect affects consumer choice, others deny its importance when making a purchasing decision (Dinnie, 2004, p. 168). Häuble and Elrod (1999, p. 205) are of the opinion that when consumers freely recognize the country of origin of the product, along with its brand, the perception of product quality becomes more positive. Without denying the existence of the product country-of-origin effect in international marketing, Agrawal and Kamakura (1999, p. 259), comparing the quality of similar products of individual firms, found a differentiation in the qualitative characteristics.

Approaches to country brand promotion are quite diverse. A number of scholars considered certain aspects of this issue in the following areas of research. Cowan and Guzman (2018) made a unique contribution to the dialogue about the influence of the country of origin on the effectiveness of the corporate social responsibility (CSR) signal, using the country-of-origin sustainable reputation of the brand (COSR) based on a comparison of sustainability signals and CSR. An interesting conclusion is that consumers' misperceptions about sustainable development affect domestic performance and brand equity. With regard to equity, consumer perception of CSR signals and sustainability contribute to increasing brand value and may be more effective for corporate brands with low or medium COSR ratings.

Heine et al. (2019) developed a model of concept management by facet affiliations of a brand country of origin (COO) for hybrid brands in the context of Chinese luxury brands. Practical conclusions will help brand managers understand which COO facets make a luxury brand "Chinese" one and, on the other hand, how to increase the brand prestige.

The studies by Eng et al. (2016) showed that localization of international business results in different countries-of-origin effects in terms of compliance between a brand of origin and a country of production (COP). Both the country of production and the brand of origin may not coincide, which casts doubt on the impact of incompliance on the brand, consumer ethnocentrism and localization problems, especially when a well-known brand comes from a developed country and COP is in a developing country. The researchers expanded their past studies of the COO effect to find out if COP adversely affected the perception of a consumer product and the buyer's decision to purchase a well-known brand. Their studies showed that a brand origin was especially important for consumers in a developed country when evaluating products, while perceived brand image and price were key factors for consumers in a developing country.

Wang et al. (2020) researched private-label brands as alternatives to national brands. In their opinion, low (vs high) status consumers are more attracted to national brands. Interestingly, this effect appeared only for products low, compared to high, in symbolism. In addition, their results showed that the interactive influence of power distance belief status and consumers on brand preferences was determined by consumers' status consumption needs.

Cristea et al. (2015) examined the main moderating factors of the country of origin and analyzed their impact on consumer's brand perceptions at the cognitive, affective and regulatory levels. They suggested creating an optimal congruence between the country of origin and brand positioning elements.

Bassols (2016) studied branding and marketing in the context of conflict-ridden destinations. He examined the history and development of the country brand in terms of tourism development.

Chan and Ilicic (2019) concluded that conservatism might be associated with stronger attachment bonds to brands. An important role could be played by the political ideology of consumers, which might result in their attachment to the domestic (as opposed to foreign) country of origin.

Kotler and Gertner (2002) considered the extent of the impact made by the country's widespread images on its attitude towards its goods and services, and its ability to attract investment, business and tourists. They also evaluated the role of strategic marketing management in promoting the country's image, attractiveness and products.

The publication of Heslop et al. (2013) presented new insight into the reputational image transfers of mega-events and the places where they occurred. Thus, the Olympic Games in Beijing increased the reputation and image of neither the Olympic brand nor China, whereas in Vancouver they became positive for both.

Bahadir et al. (2015) provided evidence that country-market characteristics moderated the relationship between the complete set of marketing mix elements and brand sales. While distribution and price had the greatest impact in developing and developed countries, product innovations and advertising had a much greater impact in emerging markets compared to developed countries.

Zhou et al. (2010) confirmed that confidence in brand origin identification (CBO) mitigated the influence of perceived brand foreignness on consumer evaluations of brand value. Moreover, the moderating influence of CBO was more profound for local than for foreign brands. Their publication discussed the managerial implications for creating both global and local brands in emerging markets.

At different time periods Schooler (1965), Guina and Giraldi (2014), and Martynova (2018) concluded that there were differences in perceptions of the country of origin by different age groups.

A team of authors headed by Alpysbaeva (2017) studying the effects of integration, calculated the Lafay index and Balassa index for a country to identify the impact of international specifications on the formation of competitive advantages. It was determined that the level of product exportability was not significantly affected by prices, quality and expansion of market volumes within the EAEU.

However, with a large number of studies in this area, the problems of an integrated approach to shaping of government-supported country brand programs based on compliance with international standards and the fundamentals of economic liberalization have not been sufficiently studied. At the same time, the study of the problem of managing country brand promotion in the Russian economy is open and provides for the development of tools that correspond to the basic characteristics of fair competition in the global economy based on the WTO agreements.

3. Materials and methods

The analysis of the "Made in China 2025" program (MIC 2025) confirmed its comprehensive approach to supporting national development challenges. This program is an initiative aimed at securing China's position as a world leader in high-tech industries. MIC 2025 distinctive feature is its reliance on the development of the real

sector of the national economy, which is defined as the basis for China to acquire the status of a world power. This program is targeted at reducing the country's dependence on imports of foreign technologies and investment, stimulating the development of the national economy, relying on domestic innovations, and forming the basis of the Chinese business community that will be able to compete, both domestically and in the world market. China considers the MIC 2025 as a chance to fully integrate into the global reproduction processes and the global value chains, acquiring a sufficiently high share in them (Perskaya, 2019, p. 39).

According to the research of Taguchi (2018, p. 9), a professor at Saitama University (Japan), the share of value added created in China is increasing, while value added in global value chains (GVCs) is decreasing in all production sectors because of foreign production. A study of the process of creating internal added value in China showed that, despite the support of manufacturing industries, the contribution of services (such as trade, utilities, other types of business) is significantly higher with the exception of sectors manufacturing food and metal products, where, according to the Chinese statistics, rural farming and mining are basic industries. Driven by MIC 2025 program, the Chinese economy has entered a phase of restoration of domestic production of value added, stimulating development through domestic consumption. An increase in China's share in GVCs as part of infrastructure projects contributes to large-scale restructuring of the Chinese economy (Yi, 2018, p. 3). The main problem of the "Made in China 2025" program is the toolkit for its implementation, since it applies exclusively administrative methods, subordinate to the decisions of the party bodies.

According to the expert assessment, the economic community of developed countries takes MIC 2025 program quite sharply, seeing it as a threat to fair competition in the world market. The transition from labor-intensive industries and an increase in the share of Chinese manufacturers in value chains with rising wages are determined as the main development paths for China aiming to prevent them from falling into the so-called middle-income trap. The danger of the program, in opinion of experts, is that China is not only becoming a high-tech economy, but, using protectionist methods and ignoring the fairness of competition in world markets, it is attempting to replace Western trans-national corporations (TNCs) in GVCs (Laskai, 2018).

It should also be noted that the MIC 2025 is a program that applies exclusively to the Chinese socio-political system and takes into account the mentality of the Chinese business community. The declaration of its goals and objectives, an indication of possible implementation tools is accompanied by real actions of the local party administrative apparatus, tight control and punishment for untimely execution.

A study of the peculiarities of the American approach to this topic showed that in the United States the main focus is on encouraging the acquisition of American products and increasing employment.

US President Trump's Buy American and Hire American Executive Order of April 18, 2017 was only a legacy of the 1933 Buy American Act and other acts passed thereafter. It contains requirements for the use of products predominantly manufactured within the country when making public procurement, restricting the access of foreign goods to the domestic market, assessing the impact of US free trade agreements with foreign countries and changing the rules for issuing work visas.

The analysis of this Executive Order showed toughening the requirements for public procurement, tightening control over spending of public funds, and increasing import duties on certain types of products. These results made it possible to enhance the consumption of goods produced in the United States, especially steel, iron, aluminum and cement. By revising free trade agreements with Canada, Mexico, and the Republic of Korea, the United States gained more favorable trading conditions for itself. As a result, it was then possible to improve trade surpluses with several other countries. By the summer of 2018, 3.7 million new jobs were created, and for the first

time in the 21st century, more job openings were available in America than the number of job seekers (Acosta, 2018).

The most significant negative consequences of the measures taken were the rise in prices of infrastructure projects; the emergence of difficulties in the sale of products of several industries, including the automotive one; decrease in the foreign direct investment (FDI) inflow; and the growing conflicts between the United States and its trading partners, primarily with China. With regard to the useful American experience in stimulating exports, it is advisable to note the establishment of digital attachés in the diplomatic missions of the United States abroad, which, in the context of the economy digitalization, contributes to the promotion of the export of American goods and services (Revenko & Revenko, 2019, p. 19).

The Make in India program, being a logical continuation of the country's large-scale economic liberalization in 1991-1992, has now acquired a more protectionist focus and aims to create a large domestic consumption market. One of its main tasks is to stimulate the foreign investment inflow in the Indian economy, in the interests of launching and expanding production, gaining access to advanced technologies and increasing export volume. India has also planned to increase the share of the manufacturing sector in the GDP from 15% to 25% by 2025 (Pakhomov, 2014). Practical steps to implement this program include the opening of many sectors of the economy to foreign investment, application of the Automatic route for investment in most of them (i.e., the non-resident of the national company does not require any approval from the government bodies), and simplification of procedures associated with company establishment and business transactions. Industrial clusters representing a modern infrastructure within five corridors are also being built.

As a result, FDI increased significantly in the Indian economy: in 2014-2019 they amounted to USD 335.33 billion, which represents about 51% since 2000. The largest investment inflow was recorded in the 2018-2019 fiscal year totaling USD 62 billion (Make in India, 2020). The largest amounts were invested in telecommunications, computer hardware and software, automotive industry, port infrastructure, power industry, road construction, trade and tourism. In addition, the position of Indian TNCs in international markets has strengthened, and India has become an exporter of capital. Thus, in 2018, the volume of Indian FDI accumulated abroad amounted to USD 166.19 billion, compared to 96.90 billion in 2010 and 1.73 billion in 2000 (United Nations Conference on Trade and Development, 2019, p. 218).

The abundance of cheap English-speaking workforce is a competitive advantage of India, which facilitates the interaction of Western employers with local employees. The factors hindering the successful implementation of the program include the lack of qualified personnel and electric power, the underdeveloped transport infrastructure, the complicated Indian legislation, the difficulties in interacting with government organizations, and periodic conflicts with trade unions.

For the period until 2030, one of the key tasks for India is to intensify activities to ensure the development of long-term planning, and against the background of protectionist support, automation, demographic changes in terms of increasing the number of young people, innovation, and a huge domestic market should become the growth drivers for the national economy. In the context of a sharp change in the business environment for India, it is most important to establish a balance between reality and formulated plans in terms of sustainable development of the country (Somvanshi, 2019).

As for Russia, the analysis of consumer preferences for a number of product groups in January-April 2019, which was carried out using the statistical method based on the data of the Federal State Statistics Service, showed that preferences are mainly given to Russian-made products (66%). Household goods and medical products of Russian

manufacture are chosen by 47% of consumers, with 27% of consumers preferring Russian made shoes, 25% of consumers lean toward domestic clothes, 11.4% opt for domestic cars, and only 3.6% of respondents choose domestic high-tech products. As a result, it was concluded that the quality of the products, rather than the product country-of-origin effect, affects the preference of domestic or imported goods.

While choosing products of a foreign manufacturer, the lower price plays a role for the Russians; this choice is also determined by the traditional perception, rooted in Soviet reality, and implying that a foreign product is always more original, has higher quality and allows the owner to "stand out from the general group" of consumers.

Currently, respondents pay special attention to product safety. Food products are the leaders in the consumption of domestic goods. Out of 170 consumers who prefer foreign-made products, 90.9% choose it because of their higher quality, noting the innovativeness of the products, the best design and the use of new technologies in their production.

Assessment of the competitiveness of Russian goods and services in the domestic and foreign markets depending the use of the product country-of-origin effect, as exemplified by the chocolate market, enabled to conclude that the development/production of the goods and the headquarters of the company should be in the product country of origin. The price for products manufactured in Russia does not play a significant role, but this factor determines the consumer choice for foreign brands of chocolate (Dityashova, 2016).

To justify the need for protectionist measures, it is possible to use the method of expert assessments, since it is impossible to directly measure protectionism data. Therefore, the expert assessment of the results will be the most accurate method.

It seems rational to distinguish representatives of business structures and government agencies that cooperate on an ongoing basis and their area of activity is focused on achieving results related to the promotion of Russian products abroad. When choosing experts for the group, it was assumed that the expert should be authoritative in the issue at hand, and participate in the process being evaluated, or use its results. Top-level managers, their deputies, and head specialists meet these criteria. Mutual assessment of experts can be the basis for an objective selection of the most competent participants. The selection is a kind of sociometric survey, within the boundaries of which the most competent specialist is selected from the respondent's viewpoint. The participants are numbered from one onwards in Table 1.

Table 1. Composition of experts conducting the crossover evaluation procedure

List of representatives of public authorities	List of business representatives
1. A representative of the Ministry of Science and Higher Education.	18. A member of the Chamber of Commerce and Industry of Russia.
2. A representative of the Ministry of Natural Resources and Ecology.	19. A representative of the Russian Union of Industrialists and Entrepreneurs.
3. A representative of the Ministry of Industry and Trade.	20. A representative of the Russian Export Center.
4. A representative of the Ministry for the Development of the Far East and the Arctic.	21. An employee of an engineering company.
5. A representative of the Ministry of Agriculture.	22. The head of a financial business structure.
6. A representative of the Ministry of Construction and Housing and Communal Services.	23. An employee of a brokerage company.
7. A representative of the Ministry of Transport.	24. A representative of a rating agency
8. A representative of the Ministry of Labor and Social Protection.	25. A representative of a consulting company.
9. A representative of the Ministry of Finance.	26. The head of the transport company
10. A representative of the Ministry of Digital Development, Communications and Mass Media.	
11. A representative of the Ministry of Economic Development.	
12. A representative of the Ministry of Energy.	
13. A representative of the Federal Antimonopoly Service.	
14. A representative of the Federal Agency for Technical Regulation and Metrology.	
15. A representative of the Federal Service for Intellectual Property.	
16. A representative of the Federal Customs Service.	
17. A representative of the Federal Tax Service	
In total 26 persons make up 100%.	

Source: the authors

As a result, to take decision on the particular criterion "The need to apply protectionist measures" in accordance with the method of mutual evaluation, it is proposed to select 12 people for the working group. The findings of the sociometric survey were entered into the table; The experts participating in the mutual assessment procedure are indicated by numbers 1-26. In this case, the number 1 in the table cell indicates the choice, "-" is a negative assessment or lack of choice.

To refine the estimates, the weight of each expert was determined. Twelve most competent experts were selected of the total number of candidates; the experts numbered 5, 1, 23, 13, 7, 18, 4, 9, 11, 24, 14, 12 were considered preferable. The expert can give personal self-assessment, which may also be a basis for the final selection of the expert.

Collective methods are also selected along with individual ones. Using the Delphi method is possible in situations where the generality is determined by the parameters of two types – consistency between experts and accuracy.

The authors used an expert assessment in their study taking into account the coefficient of concordance, which is necessary to identify the level of agreement for some series of values of the pre-ranked variables. The main purpose of the assessment is to understand the possibility of the need for protectionist measures on specific grounds (from one or more), and the best option is selected for the set when comparing them. To obtain a qualitative result, the level of agreement in the assessing experts' work is first determined.

The assessment enabled to rank and determine the significance of the experts' properties.

Rank 1 corresponds to the most significant of the experts, rank n denotes the less important one; the rest are within $2 - (n - 1)$.

The problem of allocating a candidate of the i-th place from two entails the assignment of rank $(i + (i + 1)) / 2 = i + 0.5$.

Non-randomness of the consent nature, and the consistency of expert opinions correspond to the coefficient of concordance (C).

Calculation scheme for C:
a) the sum of ranks a_{ij} is determined for each property and group of participants: $j\left(\sum_j a_{ij}\right)$;

b) the average sum of ranks Σa_{ij} is determined for each property:
$$\overline{\Sigma a_{ij}} = 0.5g(n + 1) \tag{1}$$
where g is a number of experts;
n is the number of properties.
$$\overline{\Sigma a_{ij}} = 0{,}5g(n + 1) = 0{,}5 \times 26 \times (8 + 1) = 117 \tag{2}$$
c) deviation of the Δ_i sum of ranks from the average sum of ranks is determined for each property:
$$\Delta_i = |\Sigma a_{ij} - \overline{\Sigma a_{ij}}| \tag{3}$$

$\Delta_1 = |\Sigma a_{ij} - \overline{\Sigma a_{ij}}| = |47 - 117| = 60$ $\qquad$ $\Delta_5 = |\Sigma a_{ij} - \overline{\Sigma a_{ij}}| = |208 - 117| = 91$

$\Delta_2 = |\Sigma a_{ij} - \overline{\Sigma a_{ij}}| = |73 - 117| = 44$ $\qquad$ $\Delta_6 = |\Sigma a_{ij} - \overline{\Sigma a_{ij}}| = |140 - 117| = 23$

$\Delta_3 = |\Sigma a_{ij} - \overline{\Sigma a_{ij}}| = |141 - 117| = 24$ $\qquad$ $\Delta_7 = |\Sigma a_{ij} - \overline{\Sigma a_{ij}}| = |51 - 117| = 66$

$\Delta_4 = |\Sigma a_{ij} - \overline{\Sigma a_{ij}}| = |167 - 117| = 50$ $\qquad$ $\Delta_8 = |\Sigma a_{ij} - \overline{\Sigma a_{ij}}| = |109 - 117| = 8$

d) the sum of the squared deviations for all the properties is determined:
$$S = \Sigma a_{ij}\Delta^2_i \tag{4}$$

$S_1 = 60^2 = 3600$ $\qquad\qquad$ $S_5 = 91^2 = 8281$

$S_2 = 44^2 = 1936$ $\qquad\qquad$ $S_6 = 23^2 = 529$

$S_3 = 24^2 = 576$ $\qquad\qquad$ $S_7 = 66^2 = 4356$

$S_4 = 50^2 = 2500$ $\qquad\qquad$ $S_8 = 8^2 = 64$

$$S = 21\ 842$$

e) the number of repeated ranks of each specialist is calculated, if this happens; the numbers of repeating ranks are not summarized (for example, when repeating rank 5 for three times and rank 3 for two times, 3 + 2 is recorded);
f) if the ranks are repeated, the indicator of their interconnectedness is calculated:
$$T_j = 1 / 2\Sigma (t^3_j - t), \tag{5}$$
where t_j is the number of repetitions for each rank and each expert;
g) in this case the coefficient of concordance is determined as follows:
$$C = \frac{S}{1 / 12 \times g^2(n^3 - n) - g \sum_{j=1} T_{j.}} \tag{6}$$

If there are no coincidence in the ranks with $T_j = 0$, C is determined as follows:
$$C = (12S) / g^2(n^3 - n) \tag{7}$$
$$C = 12 \times 21842 / 676 \times (512 - 8) = 0.76.$$

Thus, the coefficient of concordance varies in the range from 0 to +1 (the case when all experts gave the same assessment for the properties).

If the coefficient is close to 1, we observe a unity of opinion.

Experts were interviewed in the form of questionnaires on the following issues:
1. Does the application of protectionist measures assist in promotion of domestic export-oriented products?
2. Are protectionist measures in demand in the domestic market?
3. Is there an alternative to protectionist measures?
4. Are there government programs aimed at protectionism?
5. Does the application of protectionist measures harm the country's politics, economy, social and ecological environment?
6. Are there any mechanisms for the application of protectionist measures that are different from those currently used?
7. Is it profitable to carry out reforms on the application of protectionist measures, or is it better to keep everything at the previous level?
8. Is it beneficial to take protectionist measures?
9. Is it beneficial to strengthen the role of protectionist measures?

After the interview, expert estimates were summarized using methods of mathematical statistics that allow for combination of these estimates into an integrated assessment of the need for protectionist measures. There is a sufficient number of expert assessment options.

To assess the criterion concerning the need for protectionist measures twelve experts of the working group were interviewed. Their responses were evaluated on a 10-point scale (Table 2).

Table 2. Experts' replies to the questionnaire

Question number	Experts											
	Representatives of public authorities									Business representatives		
	Exp. 1	Exp. 2	Exp. 3	Exp. 4	Exp. 5	Exp. 6	Exp. 7	Exp. 8	Exp. 9	Exp. 10	Exp. 11	Exp. 12
1	5	4	6	5	5	5	6	5	5	9	10	9
2	6	6	6	6	3	5	7	5	5	9	10	9
3	6	5	6	5	6	5	5	3	5	10	8	10
4	3	3	3	3	3	3	5	6	3	10	10	9
5	6	3	4	6	3	5	6	4	5	9	10	9
6	5	5	3	5	3	5	5	6	3	10	10	10
7	5	5	6	4	5	6	3	3	4	7	10	10
8	3	3	5	5	6	6	5	5	3	9	10	10
9	6	4	5	6	3	5	6	6	6	10	10	9
The sum of the points of experts' replies	384									256		
Group average score	6									4		

Source: the authors

This research showed that there are prerequisites for the uncertainty of the external environment when exporting products, subject to the WTO rules.

After an expert assessment, the following aspects can be distinguished. The choice of the expert assessment method is justified, since the errors of economic measurements are diverse. The literature refers to more than 80 different types of measurement errors. In the physical measurement, random errors are most common; they may be eliminated by repeated measurements. However, the very possibility of repeated measurements is very problematic due to the irreproducibility of the measurement conditions, as well as an available negative reaction to repeated measurements by both objects and subjects of measurement, leading to the appearance of semantic and pragmatic errors.

By using the Ishikawa diagram, it becomes possible to graphically present the findings and determine the most significant cause-and-effect relationships between the factors and consequences in the problem being investigated. Such a diagram makes it possible to identify the key relationships between various factors and more accurately understand the process under study; it assists in revealing the main factors that have a significant impact on the development of the problem under consideration, and also helps build a graphical model for shaping a government-supported country brand program.

4. Results

The most significant results of the study include:
- stances of the world's major economies regarding brand support programs have been analyzed;
- the need for institutional transformation has been identified – the development of a comprehensive government-supported program to promote the national brand and domestic products in the foreign markets as the follow-up of the "Made in Russia" initiative;
- based on the expert assessment, the use of government protectionist measures in conditions of external environment uncertainty when exporting products has been justified, subject to the compliance with the WTO rules;
- a graphical model has been developed for shaping a government-supported country brand program to achieve leading positions in the international competition based on the approach of K. Ishikawa – "fishbone diagram" (Figure 1).
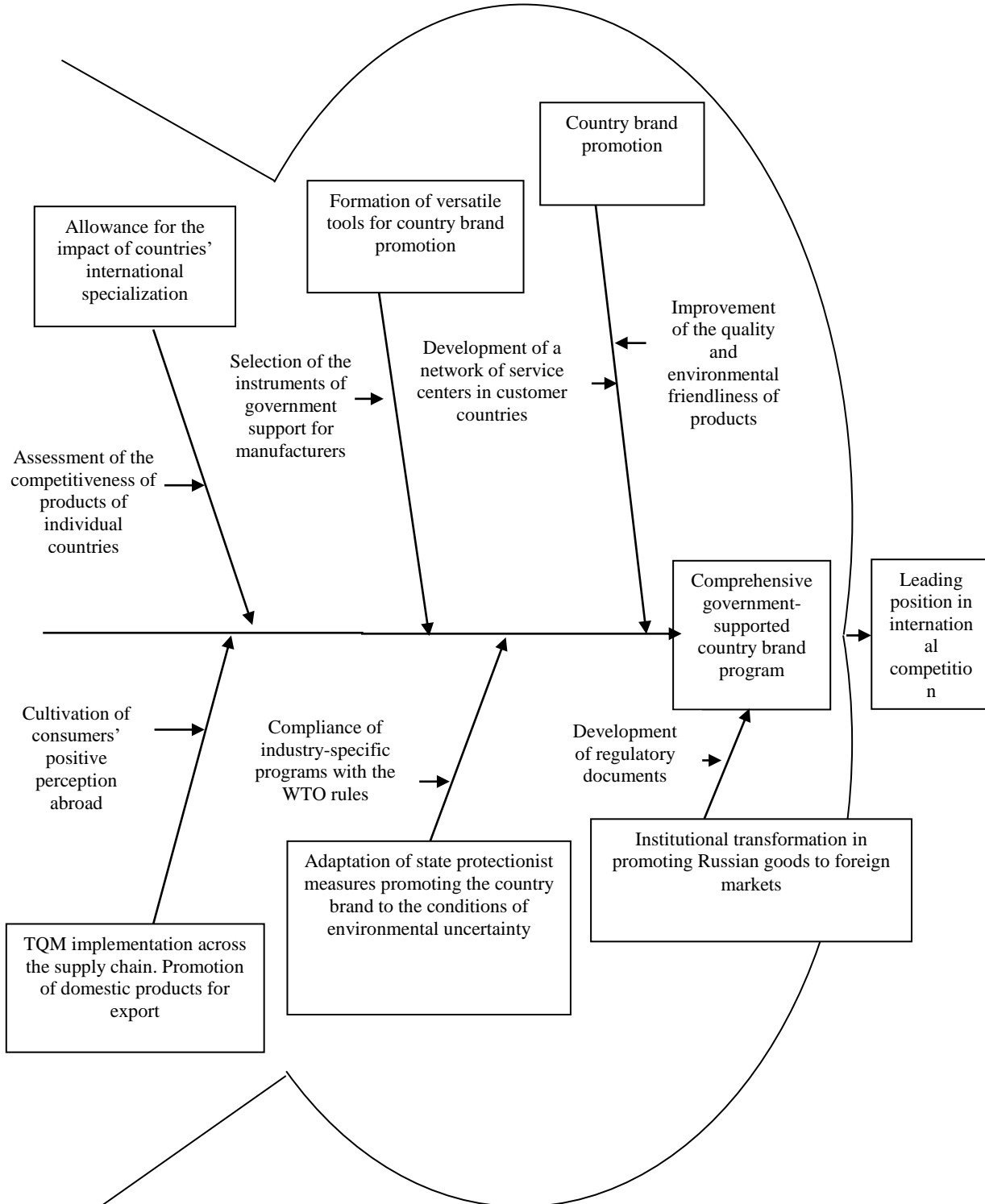
5. Discussion

The "Made in Russia" initiative is essentially an exclusive umbrella brand, which should ensure the entry of Russian manufacturers into foreign markets. However, it is impossible to achieve this large-scale promotion only by advertising.

In 2019, the Russian Export Center (REC) developed the Rules for the Operation of the Made in Russia Voluntary Certification System, regulating an independent and qualified assessment of the compliance of Russian products, works and services intended for export with the WTO rules.

In addition, the authors, analyzing, in particular, the practice of the USA and Canada in promoting goods to foreign markets, came to the conclusion that the "Made in Russia" brand, focused on compliance of products entering foreign markets with such characteristics as quality and reliability, accessibility and popularity, can be a competitive advantage provided that the implementation of the national image support policy is consistent.

The research results confirmed the hypothesis of the importance of developing a comprehensive government-supported country brand program. It was revealed that for systematic and coordinated state support of the umbrella national brand – with simultaneous support for regional/local brands to bring them to foreign markets, at this stage it seems inappropriate to transform the "Made in Russia" initiative into a comprehensive program without applying the protectionist policy.

This initiative should obtain formation and regulation mechanisms for all components of the reproductive chain of creation and implementation of a foreign trade product. The "Made in Russia" brand can be a competitive advantage if the government consistently implements a national image support policy by promoting and presenting the advantages of domestic products in foreign countries.

Current international economic relations adapt the actions of different states toward the deglobalization processes. The question arises of mutual understanding between the government and business in these conditions. The expert assessment carried out reflects the striving of business and the government for protectionist measures, which is explained by the desire to preserve the profitability of production. However, these measures can be considered forced when the enterprises themselves are unable to achieve environmental friendliness and quality in the production of products, which affects the country brand. Thus, the transition from the "Made in Russia" initiative to a full-fledged comprehensive country brand support program requires protectionist measures aimed at improving the environmental friendliness and quality of domestic products. At the same time, liberal values and compliance with international agreements within the WTO should continue to be a guideline.

The authors believe that further support of the export capacity of Russian industries and the introduction of producers on foreign markets requires orientation towards a liberalization policy. For these purposes, within the framework of the REC or under its auspices, including in the constituent entities of the Russian Federation, it is advisable to establish specialized intermediary companies – foreign trade mediators operating under the terms of commission or commercial mandate agreements, for launching and promoting Russian products to foreign markets. The REC could also conduct quarterly analytical market studies being of potential interest to Russian producers, with the publication of brief recommendations on the website, and provide companies with analytical findings on commercial contractual terms. In addition, the network of REC offices should be expanded in the Russian regions, especially those with exportable industrial potential, including by direct contact with business entities and the organization of the educational process according to the rules, specifics and procedure for exporting products.

To increase the exporters' responsibility regarding their use of an umbrella brand and the implementation of online sales, it is advisable to expand the list of platforms or channels supported by the RECs that ideally meet the needs of small companies seeking to use more than one distribution channel.

Conclusions

The development of civilized relationships that rely on the recognition of fair competition in the global economy, which forms the basis of countries' arrangements within the WTO, reinforces the need to develop comprehensive government-supported country brand programs. These programs make it possible to support companies in domestic markets using protectionist measures that meet the quality and environmental requirements to their products, which contributes to the cultivation of a country's positive image in the international arena.

An analysis of the positions of the world's major economies in relation to brand support programs revealed that the Chinese public enforcement tools for closing down (or moving outside the national territory) inefficient enterprises or those not meeting modernization goals, and lack of acknowledgement from party authorities of the emerging problems of unemployment and social insecurity in citizens, would hardly be applicable in Russia. However, the de-bureaucratization of the processes and terms of connecting newly created companies to electric power networks, orientation toward the use of broadband Internet in the operation of small and medium-sized businesses, and the provision of consulting services by specialized scientific and legal companies to increase labor productivity and export volumes may be relevant.

India's experience in changing the mechanism of VAT refund and hidden subsidy process is of some interest, in particular, the application of the Rebate of State Levies scheme, which involves a partial refund of the Goods and Service Tax (analogous to Russian VAT). The GST is paid by exporters and is not a subsidy.

In summary, it should be emphasized that all government-supported country brand programs are instruments of state regulation or direct management: they are prepared by governments, and the progress of their implementation is strictly controlled by state bodies. The government funds and local budgets are used to implement these programs. Agencies or export centers, export-import and development banks, and specially authorized government officials act as the main entities authorized by the governments of the countries within these programs. The specifics of the program implementation are determined by the socio-political and administrative arrangement of the country.

The researchers substantiated the use of governmental protectionist measures in conditions of environmental uncertainty when exporting products in compliance with the WTO rules. It has been proven that shaping a comprehensive government-supported country brand program requires protectionist measures that create manufacturing conditions for products that have the necessary quality and environmental friendliness in the context of uncertainty around exporting goods in order for that country to achieve a leading status in the global market.

References

Acosta, A. (2018, July 23). *Reinvesting into American workforce.* The White House. https://www.whitehouse.gov/articles/reinvesting-american-workforce/?utm_source=ods&utm_medium=email&utm_campaign=1600d

Agrawal, J., & Kamakura, W. A. (1999). Country-of-Origin: A Competitive Advantage? *International Journal of Research in Marketing*, 16, 255–267. http://dx.doi.org/10.1016/S0167-8116(99)00017-8

Alpysbaeva, S. N. (Ed.). (2017). *Kazakhstan in the Eurasian Economic Union: Integration Effects.* Astana: Economic Studies Institute Press. Retrieved June 19, 2019 from http://ukros.ru/wp-content/uploads/2017/12/1-2.pdf

Bahadir, S. C., Bharadwaj, S. G., & Srivastava, R. K. (2015). Marketing Mix and Brand Sales in Global Markets: Examining the Contingent Role of Country-Market Characteristics. *Journal of International Business Studies,* 46, 596–619. http://dx.doi.org/10.1057/jibs.2014.69

Bassols, N. (2016). Branding and Promoting a Country amidst a Long-Term Conflict: The Case of Colombia. *Journal of Destination Marketing & Management,* 5 (4), 314–324. http://dx.doi.org/0.1016/j.jdmm.2016.10.001

Bown, Ch. P. (2017, June). *Steel, aluminum, lumber, solar: Trump's stealth trade protection.* Peterson Institute for International Economics. https://www.piie.com/system/files/documents/pb17-21.pdf

Campbell, A. F. (2018, September 25). *Trump's new trade deal with South Korea, explained.* Vox. https://www.vox.com/2018/9/24/17883506/trump-korea-trade-deal-korus

Chan, E. Y., & Ilicic, J. (2019). Political Ideology and Brand Attachment. *International Journal of Research in Marketing,* 36 (4), 630–646. http://dx.doi.org/10.1016/j.ijresmar.2019.04.001

Cowan, K., & Guzman, F. (2018). How CSR Reputation, Sustainability Signals, and Country-of-Origin Sustainability Reputation Contribute to Corporate Brand Performance: An Exploratory Study. *Journal of Business Research.* https://doi.org/10.1016/j.jbusres.2018.11.017

Cristea, A., Capatina, G., & Stoenescu, R.-D. (2015). Country-of-Origin Effects on Perceived Brand Positioning. *Procedia Economics and Finance*, 23, 422–427. http://dx.doi.org/10.1016/S2212-5671(15)00383-4

Dinnie, K. (2004). Country-of-Origin 1965-2004: A Literature Review. *Journal of Customer Behaviour*, 3, 165–213. http://dx.doi.org/10.1362/1475392041829537

Dityashova, I. (2016, March 4). *Russian chocolate market analysis 2015-2016.* Koloro. https://koloro.ru/blog/issledovaniya/analiz-rinka-shokolada-rossii-2015-2016.html

Eng, T.-Y., Ozdemir, S., & Michelson, G. (2016). Brand Origin and Country of Production Congruity: Evidence from the UK and China. *Journal of Business Research,* 69 (12), 5703–5711. http://dx.doi.org/10.1016/j.jbusres.2016.01.045

Guina, F. de T. C., & Giraldi, J. de M.E. (2014). The Country of Origin Effect on Brazilian Beef Trade in Europe: The Moderating Role of Gender, Age, and Product Involvement. *Journal of Food Products Marketing*, 21 (2), 123–140. http://dx.doi.org/10.1080/10454446.2012.727777

Häuble, G., & Elrod, T. (1999). The Impact of Congruity between Brand Name and Country of Production on Consumers' Product Quality Judgments. *International Journal of Research in Marketing,* 16 (3), 199–215. https://doi.org/10.1016/S0167-8116(99)00011-7

Heine, K., Atwal, G., & He, J. (2019). Managing Country-of-Origin Affiliations for Luxury Brand-Building in China. *Australasian Marketing Journal*, 27 (1), 14–23. http://dx.doi.org/10.1016/j.ausmj.2018.09.001

Heslop, L. A., Nadeau, J., O'Reilly, N., & Armenakyan, A. (2013). Mega-Event and Country Co-Branding: Image Shifts, Transfers and Reputational Impacts. *Corporate Reputation Review,* 16, 7–33. http://dx.doi.org/10.1057/crr.2012.23

Kapustina, L. M., Kondratenko, Yu. N., & Timokhina, G. S. (2017). The Effect of the Country of Origin of Goods in Export Marketing. *Science Studies,* 9 (6), 1–11. Retrieved January 13, 2020 from https://naukovedenie.ru/PDF/24EVN617.pdf

Knobel, A. (2018). *Russia has few export goods with comparative advantage.* Gaidar Institute for Economic Policy. https://www.iep.ru/en/russia-has-few-export-goods-with-comparative-advantage.html

Kotler, P., & Gertner, D. (2002). Country as Brand, Product, and Beyond: A Place Marketing and Brand Management Perspective. *Journal of Brand Management*, 9, 249–261. http://dx.doi.org/10.1057/palgrave.bm.2540076

Laskai, L. (2018, March 28). *Why Does Everyone Hate Made in China 2025?* Council on Foreign Relations. https://www.cfr.org/blog/why-does-everyone-hate-made-china-2025

Mahrinasari, M. S. (2019). The Country of Origin (COO) Model of the Indonesian and Chinese Printed Batik Products. *Journal of Southwest Jiaotong University,* 54 (4). https://doi.org/10.35741/issn.0258-2724.54.4.6

Make in India. (2020). *Foreign direct investment: Summary.* https://www.makeinindia.com/policy/foreign-direct-investment

Martynova, A. S. (2018). The Impact of the Country of Origin of Goods/Services on Consumer Behavior. *Sociodinamics*, 6, 1–8. http://dx.doi.org/10.25136/2409-7144.2018.6.26345

Pakhomov, E. (2014). Follow Mody – make in India. *BRICS Business Magazine*. Retrieved January 22, 2020, from https://bricsmagazine.com/ru/articles/sleduy-modi-delay-v-indii

Chowdhury, P., Sanjoy, P.K. (2020). Applications of MCDM methods in research on corporate sustainability: A systematic literature review. Management of Environmental Quality: An International Journal, 31(2), 385-405. https://www.emerald.com/insight/content/doi/10.1108/MEQ-12-2019-0284/full/html

Perskaya, V. V. (2019). "Made in China 2025" as a Tool for the Development of the Economic Model of Socialism with Chinese Characteristics. In E. S. Sokolova, & E. T. Mekhdiev (Ed.), Proceedings of the External Challenges and Risks for Russia in the Context of the World Community's Transition to Polycentrism: Economics, Finance and Business (ICEFB 2019), 107 (pp. 38 – 40). Atlantis Press. https://doi.org/10.2991/icefb-19.2019.10

Posen, A. S. (2018, July 23). *How Trump is repelling foreign investment. The long-term costs of economic nationalism.* Foreign Affairs. https://www.foreignaffairs.com/articles/united-states/2018-07-23/how-trump-repelling-foreign-investment

Revenko, L. S., & Revenko, N. S. (2019). Made in the USA: American Experience in Stimulating the Economy. *USA & Canada: Economics, Politics, Culture*, 9, 15–36. https://doi.org/10.31857/S032120680006295-8

Schooler, R. D. (1965). Product Bias in the Central American Common Market. *Journal of Marketing Research,* 2 (4), 394–397. https://doi.org/0.2307/3149486

Somvanshi, K. K. (2019, December 21). *Vision 2020: miles to go before goals are reached.* The Economic Times. https://economictimes.indiatimes.com/vision-2020-miles-to-go-before-goals-are-reached/articleshow/72915382.cms

Szakonyi, D. (2019, March). *Buyer beware: evaluating Russian exports under sanctions and stagnation.* PONARS Eurasia. http://www.ponarseurasia.org/memo/buyer-beware-evaluating-russian-exports-under-sanctions-and-stagnation

Taguchi, H. (2018). Domestic Value Creation in the Involvement in Global Value Chains: Evidence of China. Retrieved August 11, 2019 from https://mpra.ub.uni-muenchen.de/88436/1/MPRA_paper_88436.pdf

United Nations Conference on Trade and Development. (2019). *World investment report 2018.* https://unctad.org/en/PublicationsLibrary/wir2019_en.pdf

Vasiljeva, M. (2012). Conceptual Model of the Regional Economic Management. *RISK: Resources, Information, Supply, Competition*, 1, 286–291.

Vinogradov, A. O., Salitskii, A. I., & Semenova, N. K. (2019). US-China Economic Confrontation: Ideology, Chronology, Importance. *Vestnik RUDN. International Relations,* 19(1), 35–44. https://doi.org/10.22363/2313-0660-2019-19-1-35-46

Wang, J. J., Torelli, C. J., & Lalwani, A. K. (2020). The Interactive Effect of Power Distance Belief and Consumers' Status on Preference for National (vs. Private-label) Brands. *Journal of Business Research*, 107, 1–12. https://doi.org/10.1016/j.jbusres.2019.10.001

Workman, D. (2020, March 13). *Russia's top 10 exports.* World's Top Exports. http://www.worldstopexports.com/russias-top-10-exports/

Yi, K.-M. (2018, October 4). *Trade and global value chains.* The National Bureau of Economic Research. https://www.nber.org/internationaltrade/yi_slides.pdf

Zhou, L., Yang, Z., & Hui, M. K. (2010). Non-Local or Local Brands? A Multi-Level Investigation into Confidence in Brand Origin Identification and Its Strategic Implications. *Journal of the Academy of Marketing Science*, 38, 202–218. https://doi.org/10.1007/s11747-009-0153-1

Victoria PERSKAYA is a Doctor of Economic Sciences, Professor, Director of the Institute for Research of International Economic Relations, Financial University under the Government of the Russian Federation. Her research papers, monographs and articles have been evaluated by experts specializing in the field of world economy, as well as international economic relations. Research interests: international economic relations, international institutions, export control.
ORCID ID: orcid.org/0000-0002-1988-4374

Bari KHAIROV is a Doctor of Economic Sciences (PhD), Associate Professor, Chief Researcher at the Institute for Research of International Economic Relations, Financial University under the Government of the Russian Federation. His research papers, monographs and articles have been praised by experts specializing in government regulation of the economy and logistics integration. Research interests: logistics, innovation and public-private partnerships.
ORCID ID: orcid.org/0000-0002-6026-8258

Nikolay REVENKO is a PhD in Politics, Lead Research Fellow at the Institute for Research of International Economic Relations, Financial University under the Government of the Russian Federation. His research papers, monographs and articles have been praised by researchers specializing in digital economy and international institutions and organizations. Research interests: international economic relations, international institutions, the European Union, digital economy, migration policy, export controls.
ORCID ID: orcid.org/0000-0002-0359-5201

Saida KHAIROVA is a Doctor of Economic Sciences, Professor, Director of the Institute of Master and Graduate Studies, Siberian State Automobile and Highway University. Her research papers, monographs and articles have been praised by experts specializing in supply chain management. Research interests: logistics, marketing and quality management.
ORCID ID: orcid.org/0000-0002-5632-1589

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:
@Entrepr69728810

AN APPLICATION FOR REDUCTION OF THE NON-VALUE ACTIVITIES BY KAIZEN COSTING METHOD IN THE KENTAU TRANSFORMER PLANT[*]

Dinmukhamed Kelesbayev [1]*, Hayrulla Kozhabayev [2], Gulmira Mombekova [3], Rima Yermankulova [4], Botakoz Dandayeva [5]

[1,2,3,4,5]*Khoja Akhmet Yassawi International Kazakh-Turkish University, B.Sattarkhanov avenue, 29, Turkestan, Kazakhstan*

E-mails: [1]dinmukhamed.kelesbayev@ayu.edu.kz (Corresponding author); [2] h.kozhabayev@alageum.com;
[3] gulmira.mombekova@ayu.edu.kz;   [4] rima.yermankulova@ayu.edu.kz ; [5] botakoz.dandayeva@ayu.edu.kz

Abstract. Businesses that plan to protect and maintain their assets in increasingly competitive global environment focus on activities that do not create value and reduce the cost of these activities to produce high quality at low cost. Kaizen costing method plays an important role in reducing and eliminating these activities. The main purpose of application in this context is to determine whether the Kaizen costing method has an effect on reducing or eliminating production losses as an activity that does not create value in a transformer producing enterprise. In addition, the effect of Kaizen costing method on production costs was researched in the study, thus saving costs. The effect of Kaizen costing method has been applicated in Kentav Transformer Plant with a semi-structured interview method in order to achieve these goals and objectives, that is, in reducing the activities that do not create value in the production process and saving in production costs. In the research, only the losses in the production process are focused, and activities that do not create value other than production losses are excluded. As a result of the research, it can be said that Kaizen costing method has a positive effect in reducing production losses (defective products, faulty products, wastage and residuum) and saving in production costs.

Keywords: Non-value Activities; Production Loss; Cost Reduction; Kaizen Costing

---

1. Introduction

Today, the changes and developments that occurred both economically and technologically increased the competition even more. In an increasingly competitive environment, the attention of businesses is focused on activities that do not create value and the costs of these activities. Activities that do not create value are unnecessary activities for the business and the customer at the output level and cause additional cost burdens (Dhingra et al., 2019: 792). Activities that do not create value can move businesses away from cost leadership by increasing costs in a global competitive environment. Cost leadership is to produce the same product at a lower cost than competitors without sacrificing quality. Activities that do not create value in businesses cause cost increase and profit losses. These activities that cause an increase in costs should be reduced or eliminated without affecting the product quality and market value. The activities that do not create value in businesses and their costs are becoming more and more important in competing with competitors, and their interest in cost management has increased. Because cost management is not only limited to reducing costs, but also includes other activities across the enterprise to increase profitability (Collatto et al., 2016: 816). Reducing losses in resource use and increasing their effectiveness, making product costs easier to calculate and making healthier decisions in a global competitive environment facilitates cost management (Sowmya et al., 2020: 8284). In order to achieve success in cost management, activities that do not create value should have been focused.

In this study, the effect of Kaizen costing in reducing production losses as the activity that does not create value for producing transformers was researched. The study focuses on production losses as an activity that does not create value. First of all the summary information about non-value activities, production losses and cost management of non-value activities is given in this study. Then, by giving a literature about Kaizen costing, the aim and main components of Kaizen costing are tried to be explained. Finally, the effect of Kaizen costing system on reducing production losses from activities that do not create value was examined by a semi-structured interview technique in a company producing transformers belonging to the private sector and the results obtained were tried to be evaluated.

2. Conceptual Framework

Activities that do not create value can be seen in all managing processes of the business. For this, in any business activity, it should be focused on target activities. If the value-free activity is unnecessary for the business or does not serve the business purpose, it should be eliminated altogether (Kustono et al., 2020: 2215). As an example of activities that do not create value in a business (Shou et al., 2020: 62); unnecessary materials and packaging, poor quality, loss of production, inventory, transportation, control and unproductive working hours can be shown. In the production process, excessive material usage, causing production losses by not producing the desired quality, and unnecessary stocks, lack of control and unproductive waste of time are the activities of the companies that negatively affect the global competitive environment. The most important element that does not create value for the product produced in the production process is waste. Ohno, one of the founders of the full-time production system, defines waste as follows: Defining it as everything that creates no value on the product purchased by the customer and causes an increase in cost (Monden, 2011: 19). Elimination of waste requires reducing or eliminating all activities that do not add value to the manufactured product. It is necessary to avoid any kind of negativity that causes waste, irregularity without overloading workers and equipment during the production process (Kustono et al., 2020: 2216). Activities that do not create value also result from errors in time management and quality system. Production losses in the production process should be carefully examined, the production process should be restructured and the processing time should be further activated to eliminate

activities that do not create value. In addition, non-value-added activity times such as inspection time, transfer time and waiting time should be reduced or eliminated (Shou et al., 2020: 63).

It should not be overlooked that production losses are an important problem that occupies businesses in the global competitive environment. Production losses are the negativities that arise as a result of inadequate machine-equipment, energy, materials, labor use, and management errors in production. These drawbacks reduce profitability and productivity by increasing costs and poor quality. Production losses can be classified according to their occurrence time and qualities. Production losses according to the time of occurrence; It can be divided into three before production, during production and after production. Production losses according to their qualities; can be divided into four as defective products, faulty products, wastage and residuum (Yan et al., 2020: 55). Production losses are revealed at quality control points. Quality checks can be carried out at the beginning, middle and end of production process. With these controls, it is identified whether or not there are predetermined standards and features. While products that meet the standards that pass the quality control stage at the end of production are taken into stock, those who cannot pass the quality control stage are called defective products and faulty products (Ighravwe and Oke, 2020: 114). The defective product can be sold at normal sales price in accordance with the standards by additional processing. The defective product, on the other hand, cannot be converted into a standard product by additional processing and cannot be sold at the normal sales price of a product that complies with the standards. Parts that have a measurable sales value, such as debris, crumbs, etc. in direct materials that enter the production process, are called remainder. The leftovers can participate in the reproduction process or they can be sold at a very low price. Losses that do not have a measurable sales value due to various reasons such as shrinkage, evaporation, and loss from direct materials entering the production process are called losses. In terms of quality, waste can be divided into two as normal and abnormal. While normal waste can not be prevented, abnormal waste can be prevented as a result of increased efficiency. In summary, production losses in businesses negatively affect value formation and competitiveness by causing an increase in quality, cost and dissatisfaction and a decrease in profitability. In order to get rid of this negative effect, activities that do not create value and their costs must be managed very well.

3. Theoretical Framework

Elimination of activities that do not create value is important in terms of achieving sustainable profit purpose in the global competitive environment. These activities lead to decreased profits, higher costs and unnecessary resource consumption. It is inevitable to manage the costs of these activities to the business. In order to manage the activities costs that do not create value, it is first necessary to get rid of the activities negative effects that do not create value in the business. The way to do this is through cost management, which enables the use of business resources more effectively and rationally. Cost management is the effort to provide the necessary information for the efficient use of resources in the products production that can compete in international markets in terms of time, cost, quality and functionality, thereby maximizing the profit of the enterprise and minimizing the costs (Monden, 2016: 67). The objectives of cost management include making accurate product costing, performing product life time performance evaluation, evaluating success, understanding and evaluating processes correctly, controlling costs and helping to implement organizational strategies (Monden, 2016: 68). To put it briefly, cost management supports efforts to eliminate costs that do not create value and to continuously improve them. The costs of activities that do not create value are the costs that do not contribute to this process in terms of product value. As an example of the costs associated with activities not creating value unnecessary stock keeping, production losses, repairing defective production, spare time labor due to various production failures, quality problems can give non-value activity time (Kustono et al., 2020: 2217).

Kaizen costing system, which requires continuous improvement, plays an important role in reducing and eliminating activities that do not create value. Kaizen is a Japanese word that means getting better, improvement, and continuous improvement. It requires the continuous improvement of the work and processes in all areas of life (Monden, 2011: 20). Kaizen costing first emerged as a method used by auto manufacturers in Japan to reduce their production costs (Monden, 2016: 69). In this costing, firstly losses are identified and eliminated for cost reduction (Rof, 2011: 105). Kaizen costing is a cost management technique that is used to reduce costs during the production phase of the product's life cycle and takes periodic profitability targets into account (Ihrig et al., 2017: 225). In other words, Kaizen costing is one of the cost management techniques that focus on continuously reducing costs with all employees' participation during the production (Bozdemir, 2018: 4). Considering the definitions and theories listed above, it is understood that Kaizen costing has two main purposes (Macpherson et al., 2015: 5):

• Applying the Kaizen philosophy to the production process to achieve cost reduction

• To avoid waste by extracting the activities that does not create value from the production processes.

However, it is seen that there are five main components of Kaizen costing system. They are: Full Time Production, Work Tools, Total Productive Maintenance, and Suggestion System Poke Yoke (Macpherson et al., 2015: 5-7).

4. Literature Review

Chen (2015), in his study comparing traditional and Kaizen costing, aims to reach the cost performance standards where traditional methods adopt the understanding of cost control system, stagnation of production conditions and cost. It is stated that Kaizen costing adopts a cost reduction system and assumes continuous improvement in production. The purpose of Kaizen costing is to reach cost reduction targets. In the research carried out by Ihrig et al. (2017), 86% of the enterprises use activity-based costing system, 7% use product life cycle costing and 1% Kaizen costing system. Normal and abnormal wastage costs are taken into consideration in the majority of enterprises, and wastage costs are mostly attributed to the products. Bozdemir and Orhan (2012) conducted a survey on the applicability of Kaizen costing method in the main and sub-industry companies in the Turkish automotive industry. The companies participating in the research responded to Kaizen Costing Method with a rate of 47.0% and another method similar to Kaizen Costing under a different name in our enterprise and with a rate of 13.7% is a method applied in the production stage in our enterprise. Hacıhasanoğlu (2014) has achieved a 29% improvement in the production amount with the Kaizen activities carried out in the enterprise operating in Kayseri in order to apply the Kaizen costing method in the furniture industry and create awareness in this regard. Rodriguez and Lopez (2012), conducted a survey with 87 of 154 manufacturing companies registered Activity Based Costing, Target Costing, Kaizen Costing, Quality Cost System, Just In Time Production Environment Costing, Product Life Period Costing systems and the companies that apply cost management systems to determine which purposes they apply, and why businesses that do not apply, determine from 154 registered companies in the Stock Exchange. While the companies that apply Kaizen Costing apply with the aim of decreasing the total processing time, constantly control the production costs and reduce the production costs with the most continuous improvement efforts, the companies that do not apply Kaizen Costing do not apply due to the lack of sufficient knowledge about the application. Okutmuş and Ergul (2015) conducted field research in a five-star hotel company in Antalya regarding target costing, value analysis and Kaizen costing methods. In Kaizen costing application, it was found that the accommodation company should make a cost minimization of 1.210.000 TL in total, in order to reach the target costs, in other words, Kaizen cost target determined in order to achieve the target sales price and target sales volume in 2014. In addition, in the study, it is suggested that in the use of these methods, they should recruit and / or train qualified personnel who will apply these methods correctly. Collatto and others (2016) aimed to identify lean accounting practices consistent with strategic cost management in companies in the industrial sector working with lean manufacturing. As a result, they proved that the companies

surveyed continue to use traditional costing methods. Finally, they also proved that companies are more involved in lean manufacturing practices than lean accounting, filling a gap in the literature on the subject. Gül and Gül (2017), in their study on new methods of reducing costs in industrial food establishments, investigated what measures enterprises take to reduce costs. In order to increase the profitability of the enterprises, the most important ways they use are to reduce raw material costs and improve the current market. But to increase profitability, increasing quality, increasing price and reducing labor costs are not considered as a tool. Santos and others (2018) focused on the analysis of quality costs in the automotive industry, including a bus manufacturing company. Its main purpose is to improve the quality costs indicator by providing tools to assess the cost of failure in the manufacturing process. Kaizen-lean principles were used as methodology. Kurebwa and Mushiri's research (2019) includes the design and simulation of an integrated steering system for Sport Utility Vehicles for Toyota. In keeping with the spirit of Kaizen, in this article, they explored possible improvements in the transportation capabilities of sport utility vehicles in an energy-efficient way. As a result, it has reached three key conclusions: improved vehicle use, sustainable steering system development and autonomous driving. If a company wants to provide control and efficiency in Kaizen costing, deviation analyzes should be made for continuous improvement. If the expected savings are achieved, there is no deviation. Deviation is positive if higher savings than expected (Dhingra et al., 2019: 795).

To put it briefly, Kaizen can be considered as an effective tool for eliminating activities that do not create value in the production process in enterprises. Because this costing can be focused on the cost of direct first substance and material, direct labor and general production, as well as only one of them. Kaizen costing is a cost reduction method that helps to eliminate activities that do not add value to the product in the production process by continuous improvement.

5. Application

5.1. Purpose of the Research
The main purpose of this application is to determine whether Kaizen costing method has an effect on reducing or eliminating production losses as an activity that does not create value in a company producing transformers. In addition, by investigating the effect of Kaizen costing on production costs, it is aimed to save costs. In order to realize these goals and targets, the production losses were focused from the activities that did not create value in the production process, and other activities that did not create value were excluded.

5.2. Scope of the Research
Within the scope of the research, the effect of Kaizen costing method applied on production costs was carried out in JSC "Kentav Transformer Plant". JSC "Kentav Transformer Plant" AŞ is one of the important organizations of the Kazakhstan industry sector. Here, focusing on production losses from activities that do not create value in the production process, other activities that do not create value are excluded. The reason for the industrial sector to be considered within the scope of the study is the importance of the industrial sector for both the Kazakhstan economy and Central Asia. In the selection of this enterprise in the industry sector it is very important that business management is open to change and innovation. In addition, their interest in both of accounting information system and the provision of the information needed the emphasis placed on institutionalization as the first private transformer-producing business was effective. Therefore, only the enterprise operating in the production branch has been selected for the purpose of the application in the research and it has been included in the application.

5.3. Information About the Sample Business

JSC "Kentau Transformer Plant" (hereinafter– JSC "KTP") is known as the leading Kazakhstan producer of the transformer equipment of wide application delivered for all branches of economy, including power industry, metallurgy, mechanical engineering, transport, oil and gas complex, housing and communal sector. JSC "KTP" was founded in 1959. Since 2005 JSC "KTP" is a structural subdivision of the company "Alageum Group" created to unite several stably developing enterprises in order to promote high-quality electrical equipment in the CIS markets. Today JSC "KTP" occupies a leading position on the market of Kazakhstan for the supply of transformers voltage 6-10 kV with a market share of more than 60%.

For last years, the list of plant production reached more than 400 names. The main strategy of JSC "KTP" is delivery to the market of the best electro technical production conforming to requirements of consumers for quality, the price, delivery conditions and the provided service. Today, the plant is rightfully the leader of domestic electrical engineering, a leading manufacturer of transformer equipment. The equipment with the JSC "KTP" brand reliably works in all territory of the CIS and Central Asia. JSC "KTP" in the course of modernization was rid of "loose" production equipment of the USSR and switched to the latest high-tech equipment of leading Western and European companies, which are considered as one of the best in the world. The share of local content in the manufacture of equipment is 85%. The recommended period of technical operation of transformers is 25 years, but in fact, with proper operation and timely maintenance, the transformer operates uninterruptedly for 40-50 years (https://alageum.com/en/predpriyatiya/ao-ktz).

This enterprise is one of the first private sector enterprises of Kazakhstan in the industrial sector and annual sales revenue is around 22.76 billion tenge with 2019 data. According to data captured December 2019, 1 252 personnel are employed in 2 shifts. While many private sector enterprises terminate their activities until 2019, this business continues to grow. In this enterprise, production costs are calculated according to the full cost method in terms of scope. In this calculation, actual figures are used, and in this enterprise, the costs are distributed based on volume, and the stage cost method is applied according to the production technique (shape).

5.4. Research Methodology

Within the scope of the research, in order to get ideas about the subject, in-depth interview techniques were selected from qualitative research, which is a rich data collection management. The basic method used in the realization of the study was carried out using semi-structured interviews with the relevant managers and employees of the business. In this semi-structured interview as manager; 19 managers were interviewed such as factory manager, raw material procurement manager, business manager, personnel manager, purchasing manager, accounting manager, production manager and logistics-distribution manager. Also regarding the transformer production process, 30 people responsible for raw material purchasing and analysis, holding, pressing (curling), dyeing, drying, classification, packaging, transportation, laboratory and technical works were interviewed. The in-depth interview took 40 minutes with the factory manager, about 30 minutes with other managers and an average of 20 minutes with each employee. Interviews were carried out in December 2019. In addition, a questionnaire was applied to all managers and other personnel in the company and other employees. Due to inconsistencies and errors in the answers, some questionnaires were eliminated and 249 questionnaires were taken into consideration in the study.

Thanks to these interviews and surveys, answers to the questions were sought and the opportunity to access new information was obtained in reducing Kaizen costing activities that do not create value. In addition, the stages in the production process are observed exactly. In the study, it was preferred to collect data from the company's annual reports, internal documents, industry reports and other studies.

6. Findings and Evaluation

Data related to managers, unit officers and employees participating in the interview and survey study are shown in Table 1. According to Table 1, 5 of the participants are the top managers, 14 - factory managers, 30 - unit or department officers and the remaining 200 are other employees. The important thing in this table is that 20% (49 people) of our respondents are managers and people who work responsibly. Here, it is understood that all of the managers related to Kaizen costing have detailed information, while 67% of the employees in the production process have sufficient information and 33% have general knowledge. In addition, all of the interviewees have seen the performance of the machines in the facility sufficiently and stated that the operation is absolutely innovative, otherwise it will not be possible to survive in a violent competition environment and continuity can not be achieved.

Table 1. Positions of interview participators

Positions	Number	%
Senior Managers	5	2,0
Plant Managers	14	6,0
Unit Officers	30	12,0
Other workers	200	80,0
Total	**249**	**100**

Defective product and wastage occur as production losses in the sample enterprise. It is not taken into account because the defective product is small enough to be said to be absent. Production losses in the sample business are shown in Table 2 below and the level of loss in the business is shown in Table 3. Total production consists of defective and non-defective products totals. Waste and waste is 14% of the total production. Production losses in the enterprise are within normal limits. The share of work teams is important in the absence of a defective product. The most important reason for the defective product to occur is power outages caused by outside the enterprise. Waste is in the process of purchasing, holding and transporting raw materials and in production. Waste amount can be considered normal considering the industry sector. It is an important problem that waste in the enterprise is not used in another production process.

Table 2. Production Losses of Sample Enterprise by Years

Production Losses*	2015	2016	2017	2018	2019
Defective Products	1 348,75	1 468,60	1 593,00	1 728,00	1 934,60
Faulty Production	-	-	-	-	-
Wastage	1 926,78	2 098,00	2 275,71	2 468,57	2 763,71
Non-Defective Products	12 138,75	13 217,40	14 337,00	15 552,00	17 411,40
Total Products	**13 487,50**	**14 686,00**	**15 930,00**	**17 280,00**	**19 346,00**
*million tenge					

According to Table 3, equipment inefficiencies in the sample enterprise come to the median with a rate of 39.0%, labor inefficiencies with a rate of 36.5%, material and energy losses with a rate of 31.7%. It is not possible for the enterprise to reach the target cost with these losses during the production phase. It is possible to prevent mistakes and defects that cannot be foreseen in every business. In this case, the implementation of the Poka Yoke system,

which is the main component of Kaizen Costing, is inevitable. In this way, resource and usage planning can be done correctly. The production process will contribute to the reduction of activities that do not add value to the relevant planning, practices, controls and necessary measures.

Table 3. Level of losses occurring in enterprise

Losses Occurred	Allways		In General		Sometimes		Rarely		Never		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Equipment inefficiencies	8	32,0	39	15,7	97	39,0	47	18,9	58	23,3	249	100
Labor inefficiencies	13	5,2	39	15,7	91	36,5	65	26,1	41	16,5	249	100
Material and energy losses	12	4,8	44	17,7	79	31,7	69	27,7	45	18,1	249	100

In Table 4, production costs of the sample enterprise by years are shown in detail. All of the interviewees stated that saving is inevitable in every environment where waste. They stated that, regarding the cost factors, savings can be made at the following rates.

Direct First Substance and Material Expenses are the expenses that directly enter the body of the product and whose technical and economic value can be determined very easily (Savcı, 2012: 130). The share of direct item and material expenses in total production costs (16 444, 10 / 19 346, 00) in our sample business is approximately 85%. 80% of the interviewed people can save at least 10-15%; 20% stated that thanks to a good policy, the saving rate can be approached to 0%.

Direct Labor Expenses are related to production expense locations and are the use of value that can be directly loaded into production and form the product, changing its shape, structure and status (Savcı, 2012: 136). The share of direct labor expenses in total production costs (967, 30 / 19 346, 00) in our sample business in 2019 is approximately 5%. 87% of the interviewed people stated that they could not save and 13% stated that they could save 2-3%.

General Production Expenses, on the other hand, refer to all the use of value related to production, other than direct raw material and material costs and direct labor costs. These value uses are those that cannot be directly loaded on the manufactured product (Savcı, 2012: 138). The share of general production expenses in total production costs (1 934, 60 / 19 346, 00) in our sample business is approximately 10%. 80% of the interviewed people stated that 5-6% savings can be made if natural gas is used as fuel, and 20% can save 10% if natural gas and quality material input is used.

Table 4. Production Costs of Sample Enterprise by Years

Cost Elements *	2015	2016	2017	2018	2019
(+)Direct First Material and Material Expenses	11 464,375	12 483,10	13 540,50	14 688,00	16 444,10
(+)Direct Labor Costs	674,375	734,30	796,50	864,00	967,30
(+)General Production Expenses	1 348,75	1 468,60	1 593,00	1 728,00	1 934,60
(=)**Total Production Cost**	**13 487,50**	**14 686,00**	**15 930,00**	**17 280,00**	**19 346,00**
Total Production Number **	20 750,0	20 980,0	21 240,0	21 600,0	22 760,0
Unit Cost	0,650 tenge/piece	0,700 tenge/piece	0,750 tenge/piece	0,800 tenge/piece	0,850 tenge/piece
*million tenge **piece					

The participation of the value chain members in the cost estimation and cost reduction process in the sample business is shown in Table 5. According to this table, the value chain members generally take part in the cost estimation and cost reduction process with a rate of 40.6% from the accounting-finance department, and they usually participate in the sales and marketing department at a rate of 26.5%, product planning-design engineering and research. And they never attended at the rate of 34.1% from the development department, they usually attend at the rate of 30.9% from the purchasing service, they never attend at the rate of 32.5% from the production part, 29.7% from the quality control part. They explain that they generally attend to a certain extent, sometimes participate in distribution and logistics with a rate of 27.7% and suppliers sometimes attend with a rate of 36.5%.

Table 5. Value chain members' participation in cost estimation and cost reduction

Value Chain Members	Allways		In General		Sometimes		Rarely		Never		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Accounting / Finance	50	20,1	101	40,6	49	19,7	18	7,2	31	12,4	249	100
Sales and marketing	43	17,3	66	26,5	57	22,9	38	15,3	45	18,1	249	100
Product Planning / Design Engineering-R&D	27	10,8	55	22,1	51	20,5	31	12,4	85	34,1	249	100
Purchase	54	21,7	77	30,9	56	22,5	33	13,3	29	11,6	249	100
Production	34	13,7	62	24,9	45	18,1	27	10,8	81	32,5	249	100
Quality Control	39	15,7	74	29,7	55	22,1	40	16,1	71	16,5	249	100
Distribution / Logistics	18	7,2	53	21,3	69	27,7	46	18,5	63	25,3	249	100
Suppliers	20	8,0	53	21,3	91	36,5	54	21,7	31	12,4	249	100

Information about the application level of 5S, which is a management philosophy of Kaizen Costing System in the sample business, is shown in Table 6. According to Table 6, it can be said that the classification and standardization is good in the implementation of 5S in the sample enterprise, and the regulation, cleaning and discipline is very good. This situation increases the application level of Kaizen Costing methods for the enterprise. In addition, as a result of the structured interview and observation, it has been seen that the main components of Kaizen costing can be easily applied to all activities of the enterprise.

Table 6. Application level of 5S in business

5S	Best		Good		Middle		Worse		Worst		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Sort	72	28,9	130	52,2	39	15,7	6	2,4	2	0,8	249	100
Set in order	105	42,2	99	39,8	41	16,5	2	0,8	2	0,8	249	100
Shine	120	48,2	91	36,5	31	12,5	4	1,6	3	1,2	249	100
Standardize	79	31,7	110	44,2	46	18,5	11	4,4	3	1,2	249	100
Sustain	123	49,4	84	33,7	36	14,5	4	1,6	2	0,8	249	100

Conclusion and Recommendations

It is seen that the effect of Kaizen costing on reducing production losses from activities that do not create value has been adopted by the continuous improvement approach in the enterprise. With the continuous improvement approach, it is aimed to increase the efficiency of activities that create value, and to prevent unnecessary losses by reducing or eliminating activities that do not create value. In the enterprise, activities that do not create value related to the production process are encountered before and during production. While activities that do not create pre-production value appear as wasted time during supply and purchase, in the production process, it causes production losses due to reasons such as breakdown of machines and power outages.

Another remarkable subject about the sample business is workmanship. Here, special attention is paid to craftsmanship and attention is paid to the training and continuity of workers working in production. Even the unskilled workers are preferred by the local people who have knowledge about transformer production. In this way, the continuity of workers to work is maximized and production losses due to workmanship are minimized. The point of view of the sample enterprise over the overall production costs is also strategic. It is aimed to reduce the production losses caused by the breakdown of the machines in the production process by paying due attention to maintenance and repair.

It can be said that the exemplary enterprise has a strategic perspective regarding activities that do not create value and especially production losses. However, the most important thing to be done directly related to the first substance and material expense is the necessity to establish a standard purchasing policy regarding this cost element, not only within the factory, but also with suppliers (preparations). In this way, it is possible to save 15% in direct raw material and material expenses.

Suggestions regarding the effect of Kaizen costing system on reducing production losses have been developed by considering the answers of the questions asked during the semi-structured interview and survey study in the sample business;
- Kaizen Costing Technique should continue to be implemented by all employees at all business levels;
- Importance they attach to the implementation of 5S, which is a management philosophy, should continue;
- It is absolutely necessary to prevent unforeseen mistakes and defects, to minimize them and therefore to realize the necessity to apply Poka Yoke system;
- Cost reduction efforts for new or existing products should be carried out at both the product design and production stages.

As a result, throught the Kaizen costing, the efficiency of activities that create value can be increased and the effect of activities that do not create value can be reduced or eliminated in this exemplary enterprise producing transmormates. Briefly, with the application of Kaizen costing, activities that do not create value and cause waste in the production process can be eliminated and a positive effect can be made on production losses and production costs.

In summary terms, it is possible to apply the main components of Kaizen costing in the sample business. In this way, unnecessary stock availability, production losses, wasted time and quality problems due to various production failures can be reduced. Unnecessary transfer time and waiting time can also be eliminated. By focusing on the standards in the production process, continuous improvements can be made and internal cost reduction and productivity increase can be achieved. In this way, an advantage against its competitors can be obtained in the intense competition environment in the tea industry.

Findings obtained in this research are qualitative results. Therefore, generalization cannot be made. In further studies, the study can be supported by conducting quantitative research on the subject. In order to determine the effect of Kaizen costing on activities that do not create value more realistic, it is necessary to focus on activities that do not create value other than production losses.

References

An official website of "Alageum Electric" HC from https://alageum.com/en/predpriyatiya/ao-ktz

Bozdemir, E., Orhan, M. (2012). Üretim Maliyetlerinin Düşürülmesinde Kaizen Maliyetleme Yönteminin Rolü ve Uygulanabilirliğine Yönelik Bir Araştırma (A Study on the Role and Applicability of Kaizen Costing Method in Reducing Production Costs). *Atatürk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, Volume 15, Issue 2, Pages 463-480. https://dergipark.org.tr/tr/pub/ataunisosbil/issue/2828/38347

Bozdemir, E. (2018). Comparison of Standard and Kaizen Costing Methods in Cost Management: A Case Study. *Asian Research Journal of Business Management*, Volume 5, Issue 4, Pages 1-13. https://doi.org/10.24214/ARJBM/5/4/113

Chen, X. (2015). Instruments of Strategy Management Accounting and Their Application in Inter-Organizational Cost Management. *ICCREM 2015 - Environment and the Sustainable Building - Proceedings of the 2015 International Conference on Construction and Real Estate Management, Pages 33-41*. https://doi.org/10.1061/9780784479377.005

Collatto, D.C., De Souza, M.A., Do Nascimento, A.P., Lacerda, D.P. (2016). Interactions, convergences and interrelationships between lean accounting and strategic cost management: A study in the lean production context. *Gestao e Producao*. Volume 23, Issue 4, Pages 815-827. https://doi.org/10.1590/0104-530x1279-15

Dhingra, A.K., Kumar, S., Singh, B. (2019). Cost reduction and quality improvement through Lean-Kaizen concept using value stream map in Indian manufacturing firms. *International Journal of Systems Assurance Engineering and Management*. Volume 10, Issue 4, Pages 792-800. https://doi.org/10.1007/s13198-019-00810-z

Gül, K., Gül, M. (2017). Endüstriyel Yiyecek Endüstrisinde Tedarik Zincirinde Geriye Doğru Büyümenin Maliyet Etkisi. *Dokuz Eylül Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, Volume 19, Issue 2, Pages 231-248. https://dergipark.org.tr/tr/pub/deusosbil/issue/36365/411269

Hacıhasanoğlu, T. (2014). Üretim Maliyetlerinin Düşürülmesinde Kaizen Maliyetleme Yöntemi ve Mobilya Sektöründe Bir Uygulama. *Ekonomik ve Sosyal Araştırmalar Dergisi*, Volume 10, Year 10, No 2, Pages 47-64. https://dergipark.org.tr/en/pub/esad/issue/6070/81681

Ighravwe, D.E. and Oke, S.A. (2020). Sustenance of zero-loss on production lines using Kobetsu Kaizen of TPM with hybrid models. *Total Quality Management and Business Excellence*. Volume 31, Issue 1-2, Pages 112-136. https://doi.org/10.1080/14783363.2017.1415754

Ihrig, S., Ishizaka, A., Mohnen, A. (2017). Target setting for indirect processes: a new hybrid method for the continuous improvement management of indirect processes. *Production Planning and Control*. Volume 28, Issue 3, Pages 220-231. https://doi.org/10.1080/09537287.2016.1254830

Kustono, A.S., Mas'ud, I., Agustina, W. (2020). Elimination non value-added chain: Case in cassava fermented industry Bondowoso-Indonesia. *International Journal of Scientific and Technology Research*. Volume 9, Issue 2, Pages 2215-2218. http://www.ijstr.org/final-print/feb2020/Elimination-Non-Value-added-Chain-Case-In-Cassava-Fermented-Industry-Bondowoso-Indonesia.pdf

Kurebwa, J., Mushiri, T. (2019). Design and simulation of an integrated steering system for all-purpose Sport Utility Vehicles (SUVs) - Case for Toyota. *Procedia Manufacturing*. Volume 35, Pages 56-74. https://doi.org/10.1016/j.promfg.2019.07.002

Macpherson, W., Lockhart, J. & Kavan, H. (2015). Kaizen: a Japanese Philosophy and System for Business Excellence. *Journal of Business Strategy*, September, Volume 36, Issue 5, Pages 3-9. https://doi.org/10.1108/JBS-07-2014-0083

Monden, Yasuhiro. (2011). *Toyota Production System: An Integrated Approach to Just-In-Time*. New York: Productivity Press, 4th Edition. 566 pages. https://doi.org/10.1201/b11731

Monden, Yasuhiro. (2016). "Solving the Wage Differentials Throughout the Supply Chain by Collaborative Innovations for Changing the Parts Prices and Costs" World Scientific Book Chapters, in: Kazuki Hamada & Shufuku Hiraoka (ed.), *MANAGEMENT OF INNOVATION STRATEGY IN JAPANESE COMPANIES*, Chapter 5, Pages 67-93, World Scientific Publishing Co. Pte. Ltd. https://www.worldscientific.com/doi/pdf/10.1142/9789813100282_fmatter

Okutmuş, E., Ergül, A. (2015). Konaklama İşletmelerinde Hedef Maliyetleme, Değer Analizi ve Kaizen Maliyetleme Yöntemlerinin Birlikte Uygulanabilirliğine İlişkin Bir Araştırma. *Muhasebe ve Finansman Dergisi*, Issue 65, Pages 97-116. https://doi.org/10.25095/mufad.396519

Rodriguez, M.A., Lopez, L.F. (2012). Kaizen and Ergonomics: The Perfect Marriage. *Journal of Prevention, Assessment and Rehabilitation*, Volume 41, No 1, Pages 964–967. https://doi.org/10.3233/WOR-2012-0271-964

Rof, L.M. (2011). Kaizen Costing Method And Its Role In The Management Of An Entity. *Revista Tinerilor Economisti (The Young Economists Journal)*. Volume 1, Issue 16, Pages 104-109. http://feaa.ucv.ro/RTE/016-13.pdf

Santos, H., Pereira, M.T., Silva, F.J.G., Ferreira, L.P. (2018). A Novel Rework Costing Methodology Applied to a Bus Manufacturing Company. *Procedia Manufacturing*. Volume 17, Pages 631-637. https://doi.org/10.1016/j.promfg.2018.10.109

Shou, W., Wang, J., Wu, P., Wang, X. (2020). Value Adding and Non-Value Adding Activities in Turnaround Maintenance Process: Classification, Validation, and Benefits. *Production Planning and Control*. Volume 31, Issue 1, Pages 60-77. https://doi.org/10.1080/09537287.2019.1629038

Sowmya, C., Ramesh, V., Vijaya Kumar, P. (2020). Man Power Reduction in Moulding Operations through SWCT Study Technique. *Test Engineering and Management*. Volume 83, Pages 8284-8292. http://www.testmagzine.biz/index.php/testmagzine/article/view/5145/4154

Yan, N., Jin, X., Zhong, H., Xu, X. (2020). Loss-averse retailers' financial offerings to capital-constrained suppliers: loan vs. investment. *International Journal of Production Economics*. Volume 227, Pages 53-66. https://doi.org/10.1016/j.ijpe.2020.107665

Dinmukhamed KELESBAYEV is the Associate Professor of Department of Management and Leadership Development, Khoja Akhmet Yassawi International Kazakh-Turkish University, Turkestan, Kazakhstan. Research interests: production management, quality management, service quality, education quality, quality requirements.
ORCID ID: http://orcid.org/0000-0002-4193-8121

Hayrulla KOZHABAYEV is the PhD Student in Business Administration of Department of Management and Leadership Development, Khoja Akhmet Yassawi International Kazakh-Turkish University, Turkestan, Kazakhstan. Research interests: production management, quality management, management efficiency, kaizen concept.
ORCID ID: https://orcid.org/0000-0003-4783-9279

Gulmira MOMBEKOVA is the Assistant Professor of Department of Management and Leadership Development, Khoja Akhmet Yassawi International Kazakh-Turkish University, Turkestan, Kazakhstan. Research interests: marketing, marketing management, marketing models, marketing strategies.
ORCID ID: https://orcid.org/0000-0002-8175-5987

Rima YERMANKULOVA is the Associate Professor of Department of Management and Leadership Development, Khoja Akhmet Yassawi International Kazakh-Turkish University, Turkestan, Kazakhstan. Research interests: economic problems, economic efficiency, innovation process, general management.
ORCID ID: https://orcid.org/0000-0002-9343-5841

Botakoz DANDAYEVA is the Associate Professor of Department of Management and Leadership Development, Khoja Akhmet Yassawi International Kazakh-Turkish University, Turkestan, Kazakhstan. Research interests: financial management, financial problems, financial analysis, financial products, financial requirements.
ORCID ID: https://orcid.org/0000-0002-7742-3875

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

ROLE OF EDUCATION AND ECONOMIC GROWTH ON THE CO₂ EMISSIONS IN SAUDI ARABIA

Tarek Tawfik Yousef Alkhateeb [1], Haider Mahmood [2], Nouf Naser Altamimi [3], Maham Furqan [4]

[1,2] *College of Business Administration, Prince Sattam bin Abdulaziz University, 173 Alkharj 11942, Saudi Arabia*
[1] *Kafr Elshiekh University, Kafr Elshiekh 33511, Egypt*
[3] *Foundations of Education, Prince Sattam bin Abdulaziz University, Sa'ad Ibn Mu'adh, Al-Kharj 16278, Saudi Arabia*
[4] *Oregon State University, Corvallis, OR 97331, United States*

E-mails:,[1,2] tkhteb@yahoo.com ; [1]haidermahmood@hotmail.com; [3]nn.altamimi@psau.edu.sa ; [4]mahamfurqan@ymail.com

Abstract. Education can play an effective role in building social responsibility in a community which can help to reduce pollution emissions. This present research investigates the effects of education, energy consumption and economic growth on CO₂ emissions in Saudi Arabia using data of a period 1971-2014. We find that primary education could not affect CO₂ emissions, but, secondary education has a negative effect while energy consumption has a positive effect on CO₂ emissions. In the long run, an inverted U-shaped relationship is found between CO₂ emissions and economic growth and Kingdom is found at first stage. Hence, economic growth is responsible for environmental degradation. We recommend to enhance the secondary education to improve the environment of the Kingdom and to use cleaner source of energy to avoid negative environmental consequences of economic growth.

Keywords: Education; Economic growth; Energy consumption; CO₂ emissions

1. Introduction

The idea of environmental stability and eco-friendly economic activities has been a hot topic of debate across the world. Many countries from the developed, developing, and under-developed parts of the world are making an effort so they can identify better and smarter ways to be more sustainable. Greenhouse gases are in the middle of the discussion of environmental talks and debates since it is one of the biggest causes of environmental degradation. One aspect of this endless discussion of the determinants of pollution emissions is the contribution that education and human capital may play in this domain. The level of education can help improve the economic condition of any economy while it also raises environmental awareness among the common people. On the other hand, considering that the EKC exists in a country, there is a need to expedite the process of economic growth so that the country can reach the cut off from where the environmentally degrading effects of economic activities start to decline and the ecological footprint starts to recover. In that instance, if education can improve the economic condition of a country which eventually reduces pollution, it can be easily said that education can be used as a major source of reducing pollution in a country.

The idea of the environmental Kuznets curve (EKC) is popular in the field of environment and energy as well and the concepts argue about the inverted U-shaped relationship between environment and growth (Grossman and Krueger, 1991). It means that economic growth pollutes the environment in the first phase of EKC. In the second stage, demand for a cleaner environment may increase with further economic growth. Theoretically speaking, the idea of this sort of a relationship does make sense because in many cases, as a country makes economic progress, it has to rely on a lot of energy consumptions at the first stage of development, most of which have to do with the industrial, construction and manufacturing sector. All of these developmental activities may increase CO_2 emissions and pollute the environment due to higher energy consumption. Something similar was provided in a study by Eluwole et al. (2020) in which they mentioned that a 1% increase in kg oil equivalent of energy consumed can increase environmental degradation by 0.918%.

On the other hand, Bekun et al. (2019) mentioned that renewable energy consumption can lead to an improvement in environmental quality and fossil fuel can lead to deterioration in the environmental portfolio of a country. Alola et al. (2019) investigated the sixteen coastline Mediterranean countries using data 1995-2014 and found the bidirectional causality between renewable energy and CO_2 emissions and between food production and CO_2 emissions. They concluded that food production contributed to environmental degradation and inflation helped to reduce CO_2 emissions. Moreover, Alola (2019) investigated the effects of the policies on the CO_2 emissions in the US using quarterly data of 1990-2018. He found the positive effects of income, renewable energy consumption, trade policy, financial regulation, and monetary policy on the CO_2 emissions in both the long and short run. However, the effect of migration policy is found insignificant. Mahmood et al. (2019) found the asymmetrical effects of trade openness on the CO_2 emissions and increasing trade openness contributed to the CO_2 emissions but the effect of decreasing trade openness is found insignificant.

There is limited research on whether education has to play a role in EKC or not. Balaguer and Cantavella (2018) argued that the energy resources of a country depend on the human capital and educational systems a lot and education can play a significant role in an economy on many levels. With an expansion on the EKC, the study investigated data from 1950-2014 and it was hypothesized that a higher educational level can offset the negative effects of CO_2 emissions in the economy. They provided evidence that an increased level of education could offset the environmentally degrading effects of CO_2 emissions. It proves that an expansion in the educational system can compensate for CO_2 emissions that have resulted from income growth. It was suggested that since income growth is not as easy to manage, promoting education is always a good idea since the environmentally-

degrading effects of economic activities can then be offset without having to make things worse in the first place. With education making its way up with economic growth, sustainable environmental objectives can be met without having to enforce a stringent environmental policy.

There is a limited number of studies that analyze the relationship of various educational levels on the environment while testing other economic variables. The EKC is well investigated in the Saudi environment literature (Omri et al., 2019; Mahmood et al., 2018; Mahmood et al., 2019) but a role of education on the CO_2 emissions is still missing in the Saudi literature particularly. Ignoring the EKC, Mahmood et al. (2020) found that oil, non-oil income, and urbanization were increased the CO_2 emissions in Saudi Arabia while gasoline prices helped to reduce emissions. Although, Omri et al. (2019) have probed the role of human development on CO_2 emissions in Saudi Arabia and found an insignificant effect. Human development carries health, education, and income indicators. In which, education looks more meaningful in determining the pollution than that of health and income indicators. Therefore, the purpose of our research is to isolate the effect of education on the CO_2 emissions in Saudi Arabia ignoring other dimensions of human capital.

2. Literature Review

There is good literature on testing the EKC hypothesis in Saudi Arabia. For example, Mahmood et al. (2018) investigated EKC in Saudi Arabia and found that Saudi Arabia is found in the first phase of EKC. Further, they found that Financial Market Development (FMD) has asymmetrical effects on CO_2 emissions, and reducing FMD can lead to environmental degradation. Moreover, a decline in energy consumption can reduce CO_2 emissions. In another dimension, Mahmood et al. (2019) investigated the effects of the agriculture sector on the CO_2 emissions of Saudi Arabia and also tested the EKC hypothesis using the period 1971-2014. They found the EKC in the testing but the turning point indicated that Saudi Arabia was in the first phase of EKC. They also found the inverted U-shaped relationship between agriculture development and CO_2 emissions. However, the negative effect of the agriculture sector on CO_2 emissions was corroborated. Hence, the agriculture sector showed a pleasant environmental effect in Saudi Arabia.

Omri et al. (2019) conducted a study on Saudi Arabia to answer two major questions; one is about the EKC and the other is analyzing the effect of trade openness, FMD, human development, and FDI on the environment. The analysis aimed to investigate one of the most crucial concepts in the field of environmental economics. It was concluded that FDI, trade openness, and per capita income play a role in environmental degradation in the Kingdom which means that a higher national income, more foreign investment, and open trade relations with the neighboring countries can lead to higher emissions and degrade the environment. But, the effect of human development is found statistically insignificant. The EKC was validated and they indicated that as the country makes more economic progress, the negative effects of this environmental degradation can be offset. Mahmood et al. (2020) found the positive impact of industrialization and urbanization on the CO_2 emissions in Saudi Arabia. Alkhatlan et al. (2020) investigated the oil concentration effects in Saudi Arabia and found the negative impacts of exports and employment concentration on economic growth. Moreover, Alkhateeb and Mahmood (2020) explored and found that oil price was responsible for energy depletion in the GCC region with asymmetrical effects of magnitude. This relationship was also true in each country analysis and most of the effects were found elastic as well. Mahmood and Furqan (2020) investigated the role of oil rents on emissions. They found that oil rents have a U-shaped relationship with N_2O, Inverted-U-shaped relationships with CH_4 emissions, and linear positive relationship with CO_2 emissions.

Other than Saudi Arabia, some studies have also focused on the role of human capital in determining the environment. Zafar et al. (2019) put forward an argument that investment in the natural resources sector, human

capital, and FDI were associated with an ecological footprint in the US using data from 1970-2015. They found that energy consumption due to income growth could lead to a positive effect on the ecological footprint which deteriorated the environment. Granger causality showed a bidirectional relationship between energy consumption and ecological footprint. A similar relationship was shown between ecological footprint and economic growth and ecological footprint and human capital as well. It was suggested that the country puts more investment in human capital so that natural resources can be used more efficiently and the ecological footprint of the country could improve with time. Ma et al. (2019) worked on China using period 1995-2015 and it was mentioned by that human capital had a long-run quadratic effect on the environmental regulations which indicated that with time, the effect of education on environmental policies could improve and help to improve the ecological footprint of the country. For the sustainable development of a country, it is crucial to incorporate the education sector and focus on human capital so that the effects can be widespread. Zamil et al. (2019) explored that trade openness and economic growth had a positive contribution to the CO_2 emissions in Oman. Education is not only beneficial for the environment but has also been helpful to improve moral upbringing and to reduce social unrest (Furqan and Mahmood, 2020). Literature also signified the role of human capital and innovation to achieve sustainable development and sustainable competitive advantage (Pangarso et al., 2020; Prasetyo and Kistanti, 2020).

Yao et al. (2019) conducted a panel analysis of OECD countries to scrutinize the role of human capital on energy consumption using data 1965-2014. The results of the study provided a piece of evidence that human capital is responsible for reducing energy consumption by almost 16% which is a dramatic decline. They segregated the energy consumption matrix into two clean and dirty sections. It was shown that reduction of 17% of dirty energy consumption and up to almost 86% of clean energy consumption were associated with human capital and almost this much percentage of clean energy consumption could be improved with higher education and human capital investment as well. The results of their study suggested that countries focusing on reducing their energy consumption and making it sustainable should focus on investing in human capital. This is a win-win situation for any country since not only the natural resources can be saved, a higher level of human capital can result in economic growth which benefits the country for a long-term.

Ponce et al. (2019) analyzed the labor market returns and human capital investments and connected their role with the energy sector in an empirical study using the period 2010-2016. The labor income and educational sector were seen to play a significant role in shaping the behavior of people towards the energy and environmental sector. While poor environmental stance and policy were a result of multiple dynamics including lack of awareness and education could take a step further in helping different communities with changing their behaviors towards the sector so that overall household behavior could be changed. Using a period 1974-2014, Bano et al. (2018) found that human capital affected the CO_2 emissions in Pakistan. Both variables seemed to share a long-term relationship. Looking at these variables through the perspective of economic growth, it was also argued that while human capital investment increased in the country, CO_2 emissions could be reduced without having to give a push to economic growth. Both major variables also shared a two-way causal relationship in the long-run. Further, they argued that interactive learning environments could be used to improve the levels of understanding of the general public regarding CO_2 emissions and accumulations in a region as it could help in conducted human-facilitated sessions that could raise awareness and could remove any barriers from the learning structure. Without having to implement a strong macroeconomic policy, just educating on a small scale could make a huge difference as well (Qudrat-Ullah and Kayal 2018).

There is limited literature available on the role of education on CO_2 emissions. According to Shields (2019), higher education can be strongly linked to global climate change. International student mobility was considered as a major determinant of greenhouse gas emissions on an international level. The results indicated that although global CO_2 emissions across the world are experiencing some significantly large increase emissions per

international student have declined which is explained by changes in student mobility patterns. In a theoretical setting, the fact cannot be denied that higher education can lead to changes in the economic and social structure of a community. As a result, other segments in the region can also improve which is something that needs to be considered while devising educational policies related to higher education of international students. Taylor et al. (2007) mentioned in their study that in commercial areas, educational campaigns helped to reduce storm-water pollution to a wide extent. Although the study did not connect education to CO_2 emissions through economic growth, it was argued that higher education activities and more awareness campaigns helped to play a role in reducing pollution which magnified the importance of improving human capital and knowledge management platforms. On a practical level, countries aiming to reduce their ecological footprint should focus on educational activities more often so that they can cover some part of the pursuit through these initiatives.

Bekaroo et al. (2019) provided a unique talk on the topic of education, income growth, and their link with CO_2 emissions. They argued that sustainability change agents of higher education institutions could have the responsibility of using the platform to raise this issue among the student community. In that instance, teachers in these higher educational institutions could spread awareness in the student community and inform them about the harmful effects of these pollutants. If conducted on a long-run basis, this conversation could become a major reason for a structural change in a country and could directly influence the environment. The study took place in Mauritius and data from 440 employees of higher educational institutions was used. The results suggested implementing strong policies that could help to incorporate the educational sector in the environmental policy to a more prominent extent.

One aspect of human capital is health and some studies worked on the effect of health variables on pollution emissions. For example, Chaabouni and Saidi (2017) analyzed 51 countries to explore the association between CO_2 emissions, health spending, and income growth. Three groups of countries were selected according to income classification and data from 1995-2013 were used. A causal relationship was explored between the three variables under analysis. Additionally, unidirectional causality was also seen from CO_2 emissions to health spending levels in all countries except low-income ones. It was suggested that these countries focus on energy consumption and productivity, and also the efficiency of energy since it provides more pathways for long-term growth and can help to create a good balance. Alola and Kirikkaleli (2019) analyzed the relationship between environmental quality and renewable consumption while the concept of immigration, consumption, and healthcare was also considered. The rich analysis studied the long and short-term relationship between CO_2 emissions with the factors mentioned above. It was seen that immigration and healthcare sector amendments lead to higher CO_2 emissions in the US. Further, Alola (2019) mentioned that renewable energy consumption and real income in a country put an impact on the carbon emissions of the country but health has an insignificant effect.

The recent literature signifies the importance of education, human capital, and human development in determining pollution emissions. Most of the literature on this issue focuses on the role of human capital and human development on pollution emissions which are composite of education, health, and income growth indicators. The testing of the isolated role of education is scant in global literature and absent in Saudi literature. So, this present research is trying to fill this gap.

3. Theoretical framework

The expected inverted U-shaped relationship of income growth and pollutants' emissions, which is known as the EKC hypothesis, is initiated by Grossman and Krueger (1991). It is hypothesized because economic growth requires intense energy consumption during the first stage of development to serve the increasing economic activities which are called scale effects which may be responsible for pollution emissions. Afterward, a clean

environment may also be desired at the second stage of development which may by adopting clean technologies or diversify the economy from dirty industry to clean industry which is termed as technique and composition effects. Here, energy consumption plays an important role in shaping the EKC. Although the main idea of EKC advocates an inverted U-shaped relationship between economic growth and CO_2 emissions, some recent studies argue on a different point of view (Mahmood et al. 2019).

Yang et al. (2015) argued in their study that there is no universal model here that can fit all economies in the world. Other than an inverted U-shape, inverted-N and M shapes may be found in the relationship between income and pollutants' emissions. These results can vary depending on the economic development of a country and how it varies based on the part of the world the country falls in. Li et al. (2019) argued that there is an inconsistency in the nexus between economic growth and CO_2 emissions and mentioned that this relationship has an evolutionary nature that can be affected by time, geography, and socioeconomic aspects of a country. Other than an inverted U-shaped curve, both inverted N and M-shaped relationship can vary in different periods. Alkhateeb and Mahmood (2019) found the positive effect of trade openness on energy consumption. Moutinho et al. (2017) tested the existence of EKC in Portuguese and Spanish economies and provided evidence of an inverted N-shaped EKC. It was narrated that promoting renewable energy in the economies can help to meet urgent goals while the benefits can go a long way. The relationship of the environment and income was tested in six nuclear-generating countries and it was mentioned that nuclear energy has proven to be beneficial for the environment while income can be favorable for the environment in some instances. Nevertheless, both income and CO_2 emissions are determined on a simultaneous basis (Baek and Pride 2014).

Education may play a significant role in tracing the EKC because educated people's preference over clean energy consumption is different from un-educated people. Therefore, education is also a very important variable to regress in any pollution model which is ignored in most of the past literature. From the perspective of economics, education is considered to be a major investment in enhancing the social structure of a community. Its results might not show up immediately since it takes a couple of years for a generation to get educated. However, the long-term results of education cannot be ignored as it delivers more awareness in society and improves social responsibility (Jankal and Jankalove, 2017).

United Nations General Assembly (UNGA) adopted the 2030 Agenda according to which, sustainable development would be planned for the nations, and the agenda was called "Transforming Our World: The 2030 Agenda for Sustainable Development". The purpose of the 17 goals provided under the agenda is to ensure that three major dimensions are integrated including economic, social, and environmental segments. For education, the agenda is to ensure primary education and enable learners to acquire knowledge and skills that can help them to achieve sustainable growth and the agenda is to be achieved by 2030 (UNESCO, 2015). Education is responsible for spreading awareness and can help ensure long-term and sustainable growth (Ergen and Ergen, 2011). With primary education, misconceptions and prejudice can be removed from the societies and social responsibility can improve in communities (Jankal and Jankalove, 2017).

Recent literature has also discussed the role of education in determining energy consumption (World Bank, 2019). Some stream of recent literature also investigates the direct role of education in the pollution emissions and ecological footprints (Balaguer and Cantavella, 2018; Zafar et al., 2019; Ma et al., 2019; Bano et al., 2018). Balaguer and Cantavella (2018) argued that education may contribute to pollution emissions as educated people tend to have better income levels and demand more energy consumption items. On the other hand, education can boost social awareness which may demand clean technologies to reduce pollution emissions. Zafar et al. (2019) argued that human capital helps improve energy efficiency, adopt pollution-free technologies, and reducing fossil-fuel energy use. Further, they also found that human capital remained helpful in reducing ecological footprints in

the United States. Besides, Bano et al. (2018) argued that human capital removes pollution without harming economic growth. Moreover, Yao et al. (2019) reported that human capital is found helpful in reducing 15.36% and 17.33% of total energy consumption and dirty energy consumption respectively in the OECD countries. Further, human capital is found useful in raising 85.54% of clean energy consumption. So, education level and human capital help reduce pollution emissions and shape the EKC as these are promoting clean energy.

4. Methods

Following the theory of EKC, we are hypothesizing the quadratic effects of economic growth on CO_2 emissions. Further, literature also signifies that education and human capital are very important in determining the environmental behavior of educated people in the country. Most of the recent studies on the topic used the human capital or human development indices that capture the education, health, and income indicators (Zafar et al., 2019). But, our objective is to isolate the role of education on CO_2 emissions. Balaguer and Cantavella (2018) hypothesized the role of higher education on CO_2 emissions. But, higher education is obtained by a very limited proportion of the population and it provides specialized education, not the basic moral values. On the other hand, most of the population of any country is just benefited by primary and secondary education where basic moral values and ethics are communicated for personality development. This argument is also matched with the UNGA agenda to ensure at least a primary education for sustainable growth (UNESCO, 2015). Therefore, we are hypothesizing the two proxies of education in the CO_2 emissions model i.e. primary and secondary education, and our model is as follows:

$$C_t = f(Y_t, Y_t^2, PE_t, SE_t, EC_t) \tag{1}$$

All variables in equation 1 are in natural logarithm and t presents a maximum available sample period of 1971-2014. C_t is CO_2 emissions metric tons per capita. Y_t is GDP per capita in constant (2010) US dollars which is a proxy of economic growth and Y_t^2 is square of Y_t. EC_t is energy consumption kg of oil equivalent per capita. Data on C_t, Y_t, and EC_t are sourced from World Bank (2019). PE_t and SE_t are primary and secondary school enrolment ratios respectively. Data on PE_t and SE_t are sourced from the Government of Saudi Arabia (2019). All utilized data are available in the appendix.

After the model's discussion, a general flow chart is provided in figure 1 to understand the mechanism of estimation. Figure 1 elaborates that we need to test the stationarity of the series at first. In case of level stationary series I(0) or first difference stationary series I(1) or a mix of I(0) and I(1), we may move towards the Auto-Regressive Distributive Lag (ARDL) model because it is efficient in all of the mentioned cases due its bound testing procedure (Pesaran et al., 2001). After validation of cointegration, we may estimate the long and short-run elasticities.
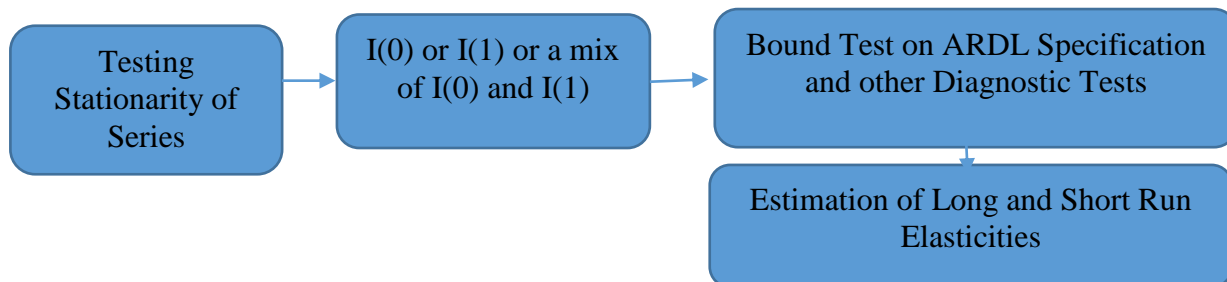
Figure 1. Flow Chart of Estimation

To check the unit root problem in the series, we use Ng and Perron's (2003) methodology because of its superiority and efficiency over the other unit root test due to the de-trending procedure. Moreover, it utilized the four test statistics to confirm the stationarity in the series. After the stationarity test, we may shift our estimation towards the cointegration test. We choose ARDL of Pesaran et al. (2001) which is efficient over other cointegration tests due to its bound testing procedure. Moreover, its parsimonious way of selection of lag lengths also saves the degree of freedom. ARDL model of equation 1 may be expressed as:

$$
\begin{aligned}
\Delta C_t = {} & \alpha_0 + \alpha_1 CO_{t-1} + \alpha_2 Y_{t-1} + \alpha_3 Y_{t-1}^2 + \alpha_4 PE_{t-1} + \alpha_5 SE_{t-1} + \alpha_6 EC_{t-1} \\
& + \sum_{j=1}^{p} \beta_{1j} \Delta C_{t-j} + \sum_{j=0}^{q} \beta_{2j} \Delta Y_{t-j} + \sum_{j=0}^{r} \beta_{3j} \Delta Y_{t-j}^2 + + \sum_{j=1}^{p} \beta_{4j} \Delta PE_{t-j} \\
& + \sum_{j=0}^{q} \beta_{5j} \Delta SE_{t-j} + \sum_{j=0}^{q} \beta_{6j} \Delta EC_{t-j} + \psi_{it}
\end{aligned}
\tag{2}
$$

Equation 2 will be tested for the existence of cointegration on a null hypothesis $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = 0$ and rejection of which would ensure the cointegration. Afterward, a diagnostic test of heteroscedasticity, serial correlation, normality of error term, and functional would be applied to ensure that estimates are out of econometric problems. Afterward, long-run effects could be calculated from normalizing procedure on the estimated α_i. To capture the short-run elasticities, Error Correction Term (ECT_{t-1}) may be replaced with the $\alpha_1 CO_{t-1} + \alpha_2 Y_{t-1} + \alpha_3 Y_{t-1}^2 + \alpha_4 PE_{t-1} + \alpha_5 SE_{t-1} + \alpha_6 EC_{t-1}$ in the following way:

$$
\begin{aligned}
\Delta C_t = {} & \sum_{j=1}^{p} \delta_{1j} \Delta C_{t-j} + \sum_{j=0}^{q} \delta_{2j} \Delta Y_{t-j} + \sum_{j=0}^{r} \delta_{3j} \Delta Y_{t-j}^2 + \sum_{j=1}^{p} \delta_{4j} \Delta PE_{t-j} \\
& + \sum_{j=0}^{q} \delta_{5j} \Delta SE_{t-j} + \sum_{j=0}^{q} \delta_{6j} \Delta EC_{t-j} + \gamma ECT_{t-1} + \zeta_{it}
\end{aligned}
\tag{3}
$$

In equation 3, negative and significant γ would validate the existence of short-run relationships and speed of convergence and δ_{ij} may explain the short effects in the model.

5. Data Analyses and Discussions

At first, the Ng-Perron unit root test is applied to all series of our model assuming intercept and trend in analysis, and results are reported in table 1. Results show that all series except SE_t are level non-stationary and SE_t is stationary at a 1% level of significance. On their first difference, C_t and Y_t are stationary at 5% and PE_t and EC_t are stationary at a 10% level of significance. Overall, SE_t is level-stationary, and rest all variables are first-difference stationery so mix integration level is substantiated. But, it is sufficient to proceed for the ARDL model as it chooses the lower-bound assuming level-stationery and upper-bound at first differenced-stationary variables (Pesaran et al., 2001). Therefore, the results of ARDL are efficient even in the presence of a mixed order of integration.

Table 1. Unit Root Test

Variable	MZa	MZt	MSB	MPT
C_t	-11.9775(0)	-2.4356	0.2034	7.6703
Y_t	-3.3017(0)	-1.2130	0.3674	26.1391
PE_t	-1.5553(3)	-0.6381	0.4103	37.4287
SE_t	-28.1419(2)***	-3.5849***	0.1274***	4.1856**
EC_t	-2.7809(0)	-1.1282	0.4057	31.1944
ΔC_t	-0.7058(0)**	-3.2054**	0.1548**	4.4746**
ΔY_t	-17.9135(0)**	-2.9801**	0.1673**	5.1414**
ΔPE_t	-14.3397(0)*	-2.6267*	0.1832*	6.6492*
ΔEC_t	-15.3313(0)*	-2.7683*	0.1806*	5.9463*

Note: *,** and *** are showing stationarity at 10%, 5% and 1% level of significance.

ARDL results of equations 2 and 3 are reported in table 2. At first, a bound test is applied to the ARDL equation, and the calculated F-value = 3.6317 is found bigger than critical bound at a 5% level of significance. The critical F-value is used from Kripfganz and Schneider (2018) which is also effective in case of a small sample size like in our case. Hence, a cointegration is corroborated in the model. Further, all diagnostic tests have p-values of more than 0.1 which validate that model has no issue of heteroscedasticity, serial correlation, functional form problem, and normality. Moreover, CUSUM and CUSUMsq tests' values are within critical bound at the bottom of the table, so estimated results are stable.

Table 2. ARDL Results

Variables	Parameter	S.E.	t-value	p-value
Long Run Results				
Y_t	24.9927	10.7700	2.3206	0.0268
Y_t^2	-1.2326	0.5363	-2.2982	0.0282
PE_t	-0.2118	0.1723	-1.2287	0.2281
SE_t	-0.1223	0.0408	-2.9999	0.0052
EC_t	0.1820	0.0448	4.0665	0.0003
Intercept	-124.7060	53.8296	-2.3167	0.0271
Short Run Results				
ΔY_t	-1.6389	4.9803	-0.3291	0.7442
ΔY_t^2	0.1134	0.2460	0.4609	0.6480
ΔPE_t	-0.0956	0.2469	-0.3871	0.7012
ΔSE_t	-1.0402	0.2260	-4.6018	0.0001
ΔEC_t	0.5895	0.1177	5.0099	0.0000
ECT_{t-1}	-0.4514	0.0829	-5.4434	0.0000
Diagnostics				
Bound Test	Calculated F-value = 3.6317		Critical Bound F-values At 1% 3.2778-4.3109 At 5% 2.5448-3.4712 At 10% 2.2001-3.0679	
F-Hetro	1.3157			0.2642
F-Serial	0.6827			0.5129
F-RESET	0.0952			0.9535
χ^2-Normality	1.5357			0.2246
CUSUM Test			CUSUMsq Test	
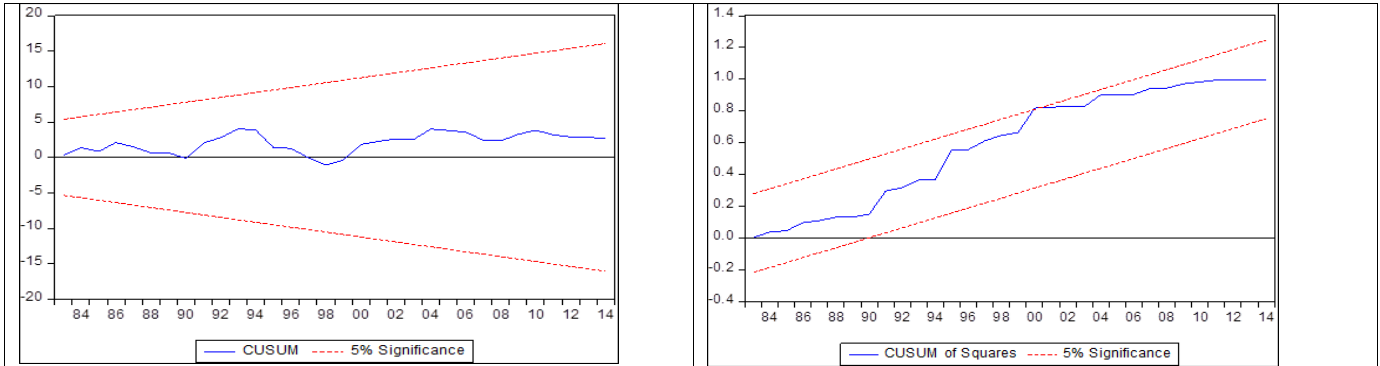
In the long run, Y_t has a positive and Y_t^2 has a negative impact on CO_2 emissions. This result is corroborating the existence of EKC in the Kingdom. Moreover, the turning point of the EKC (exponent of 24.9924/2.4652) is found at GDP per capita of 25290 constant US dollar which is more than the average sample period GDP per capita of 22900. Therefore, Saudi Arabia is found in the first stage of EKC, and increasing GDP per capita is responsible for increasing CO_2 emissions. Therefore, economic growth has negative environmental effects by emitting CO_2. This conclusion is matched with the findings of Mahmood et al. (2018) and Mahmood et al. (2019).

In the education and CO_2 emissions relationship, primary education (PE_t) has an insignificant impact on CO_2 emissions. These results make sense because primary education is a very initial stage of human capital and individuals or even groups at this level do not have enough knowledge, understanding, or resources to do something about the environment. Due to the lack of ability of decision making, primary education alone cannot do enough to give someone exposure to the emissions and environmental portfolio of their country. So, primary education is not playing any of its positive or negative role in the environmental profile of Saudi Arabia. This can be due to a reason that education and age of students at the primary level are not mature enough to convey the message of environmental awareness. However, the government should revise the syllabus of primary education to convey the message of a clean environment at this level. Secondary education (SE_t) has a negative and statistically significant effect. It means that increasing secondary education has pleasant environmental effects in terms of reducing CO_2 emissions. Moreover, the elasticity coefficient of *the SE_t* suggests that a 1% increase in SE_t could reduce 0.1223% of CO_2 emissions per capita.

This negative relationship between secondary education and CO_2 emissions corroborates the finding of Balaguer and Cantavella (2018) who found that increasing levels of education would help reduce CO_2 emissions. Further, Zafar et al. (2019) and Bano et al. (2018) also reported negative effects of human capital on the CO_2 emissions and ecological footprint respectively. This leaves a huge room for improvement in the human capital policies in a country since that platform can be used to improve the energy sector to a wide extent. Considering the multi-dimensional nature of the energy sector, it is crucial to understand that not only the policies in the energy sector can make an impact; but any decisions taken in other sectors can have a strong impact on the segment as well. It must be taken into consideration that improving the education sector can go a long way, not only would the nation have a way more educated generation, but the environment would have improved as well which would be a win-win situation for the nation in the long-run. Lastly, energy consumption (EC_t) has a positive impact on CO_2 emissions and a 1% increase in EC_t could increase by 0.182% of CO_2 emissions.

In the short run, the negative and significant γ of ECT_{t-1} corroborates the short-run relationship in the model. Further, the magnitude γ shows that short-run fluctuation could set back at a speed of 45.14% a year on the long-run path. Further, economic growth, its square, and primary education could not affect CO_2 emissions. However,

secondary education has again negative effect on the CO_2 emissions with a relatively higher elasticity coefficient compare to the long-run result. A 1% increase in SE_t could decrease the 1.0402% of CO_2 emissions. Moreover, the energy consumption has a negative short-run effect on the CO_2 emissions and a 1% increase in EC_t may increase the 0.5895% of CO_2 emissions.

Conclusions

Education may play a positive environmental role by reducing pollution emissions if education could enhance the social responsibility of the citizens. This present research tries to test the effects of primary and secondary education on the CO_2 emissions along with testing the conventional determinants of CO_2 emissions. We apply the ARDL cointegration test and use a period of 1971-2014 to investigate the said relationships. We found the cointegration in the hypothesized model and short-run relationships are also found with a speed of convergence, 45.14% a year. We validate the EKC hypothesis in Saudi Arabia with a point of inflection at 25,290 GDP per capita. But, the kingdom is found at the first stage of EKC hence its economic growth is responsible for environmental degradation through emitting CO_2. Further, the short-run effect of economic growth is found insignificant. The effect of primary education is found insignificant but increasing secondary education is found helpful in reducing CO_2 emissions. Moreover, energy consumption is increasing CO_2 emissions. Based on the results, we recommend the Kingdom to promote secondary education in the Kingdom to improve the awareness of the social responsibility of reducing pollution emissions and to use clean energy sources to remove the negative environmental effects of economic growth. Additionally, since it is mentioned that secondary education has an impact on the environment; there should be more efforts to take the educational system of the country up a notch to ensure that the segment provides positive results not only for the human capital but for the environment as well. This multi-disciplinary approach would be creative enough for the nation to move ahead and take serious actions to stop the environmental degradation in the country.

References

Alkhateeb, T.T.Y., Mahmood, H. (2019). Energy Consumption and Trade Openness Nexus in Egypt: Asymmetry Analysis. *Energies* 12(10): 2018. https://doi.org/10.3390/en12102018

Alkhateeb, T.T.Y., Mahmood, H. (2020). Oil Price and Energy Depletion Nexus in GCC countries: Asymmetry Analyses. *Energies* 13(12): 3058. https://doi.org/10.3390/en13123058

Alkhathlan, K.A., Alkhateeb, T.T.Y., Mahmood, H., Bindabel, W.A. (2020). The concentration of the oil sector or diversification in the Saudi economy: consequences on growth sustainability. *Entrepreneurship and Sustainability Issues* 7(4): 3369-3384. http://doi.org/10.9770/jesi.2020.7.4(52)

Alola, A. (2019). Carbon emissions and the trilemma of trade policy, migration policy and health care in the US. *Carbon Management* 10(2): 209-218. https://doi.org/10.1080/17583004.2019.1577180

Alola, A., Kirikkaleli, D. (2019). The nexus of environmental quality with renewable consumption, immigration, and healthcare in the US: Wavelet and Gradual-Shift causality approaches. *Environmental Science and Pollution Research* 26(34): 35208-35217. https://doi.org/10.1007/s11356-019-06522-y

Alola, A.A. (2019). The trilemma of trade, monetary and immigration policies in the United States: Accounting for environmental sustainability. *Science of the Total Environment* 658: 260-267. https://doi.org/10.1016/j.scitotenv.2018.12.212

Alola, A.A., Yalçiner, K., Alola, U.V. (2019) Renewables, food (in) security, and inflation regimes in the coastline Mediterranean countries (CMCs): the environmental pros and cons. *Environmental Science and Pollution Research* 26(33): 34448-34458. https://doi.org/10.1007/s11356-019-06576-y

Baek, J., Pride, D. (2014). On the income-nuclear energy-CO_2 emissions nexus revisited. *Energy Economics* 43: 6-10. https://doi.org/10.1016/j.eneco.2014.01.015

Balaguer, J., Cantavella, M. (2018). The Role of Education in the Environmental Kuznets Curve, Evidence from Australian Data. *Energy Economics* 70(1): 289-296. https://doi.org/10.1016/j.eneco.2018.01.021

Bano, S., Zhao, Y., Ahmad, A., Wang, S., Liu, Y. (2018). Identifying the Impacts of Human Capital on Carbon Emissions in Pakistan. *Journal of Cleaner Production* 183: 1082-1092. https://doi.org/10.1016/j.jclepro.2018.02.008

Bekaroo, G., Bakhoree, C., Ramsamy, P., Moedeen, W. (2019). Investigating Personal Carbon Emissions of Employees of Higher Education Institutions: Insights from Mauritius. *Journal of Cleaner Production* 209: 581-594. https://doi.org/10.1016/j.jclepro.2018.10.238

Bekun, F., Alola, A., Sarkodie, S. (2019). Toward a sustainable environment: Nexus between CO_2 emissions, resource rent, renewable and nonrenewable energy in 16-EU countries. *Science of the Total Environment* 657: 1023-1029. https://doi.org/10.1016/j.scitotenv.2018.12.104

Chaabouni, S., Saidi, K. (2017). The Dynamic Links Between Carbon Dioxide (CO_2) Emissions, Health Spending and GDP Growth: A Case Study for 51 Countries. *Environmental Research* 158(1): 137-144. https://doi.org/10.1016/j.envres.2017.05.041

Eluwole, K., Akadiri, S., Alola, A., Etokakpan, M. (2020). Does The Interaction between Growth Determinants a Drive for Global Environmental Sustainability? Evidence from World Top 10 Pollutant Emissions Countries. *Science of the Total Environment* 725: 1-8. https://doi.org/10.1016/j.scitotenv.2019.135972

Ergen, B., Ergen, Z. (2011). How Does Education Affect Environmental Knowledge: A Survey in Urban and Regional Planning Education. *US-China Education Review* 7: 924-931. https://eric.ed.gov/?id=ED529915

Furqan, M., Mahmood, H. (2020). Does Education Reduce Homicide? A Panel Data Analysis of Asian Region. *Quality and Quantity* 54(4): 1197-1209. https://doi.org/10.1007/s11135-020-00981-z

Government of Saudi Arabia (2019). Yearly Statistics 2019, Saudi Arabian Monetary Agency, Riyadh. https://sama.gov.sa/en-US/EconomicReports/Pages/YearlyStatistics.aspx

Grossman, G.M., Krueger, A.B. (1991). *Environmental impacts of the North American Free Trade Agreement*. NBER, Working paper 3914. https://doi.org/10.3386/w3914

Jankal, R., Jankalove, M. (2017). Social Responsibility of the Educational Institution. *Human Resources Management and Ergonomics* 11(2): 51-58. https://doi.org/10.1007/978-981-10-5047-3

Kripfganz, S., Schneider, D.C. (2018). *Response surface regressions for critical value bounds and approximate p-values in equilibrium correction models*. Manuscript, University of Exeter and Max Planck Institute for Demographic Research. www.kripfganz.de

Li, W., Yang, G., Li, X. (2019). Modeling The Evolutionary Nexus Between Carbon Dioxide Emissions and Economic Growth. *Journal of Cleaner Production* 215: 1191-1202. https://doi.org/10.1016/j.jclepro.2019.01.100

Ma, S., Dai, J., Wen, H. (2019). The Influence of Trade Openness on the Level of Human Capital in China: On the Basis of Environmental Regulation. *Journal of Cleaner Production* 225(1): 340-349. https://doi.org/10.1016/j.jclepro.2019.03.238

Mahmood, H., Alkhateeb, T.T.Y., Al-Qahtani, M.M.Z., Allam, Z., Ahmad, N., Furqan, M. (2019). Agriculture Development and CO_2 Emissions Nexus in Saudi Arabia. *PLoS ONE* 14(12): e0225865. https://doi.org/10.1371/journal.pone.0225865

Mahmood, H., Alkhateeb, T.T.Y., Furqan, M. (2020). Oil Sector and CO_2 Emissions in Saudi Arabia: Asymmetry Analysis. *Palgrave Communications* 6(1): 88. https://doi.org/10.1057/s41599-020-0470-z

Mahmood, H., Alkhateeb, T.T.Y., Furqan, M. (2020). Industrialization, urbanization and CO_2 emissions in Saudi Arabia: Asymmetry analysis. *Energy Reports* 6: 1553-1560. https://doi.org/10.1016/j.egyr.2020.06.004

Mahmood, H., Alrasheed, A., Furqan, M. (2018). Financial Market Development and Pollution Nexus in Saudi Arabia: Asymmetrical Analysis. *Energies* 11(12): 3462. https://doi.org/10.3390/en11123462

Mahmood, H., Furqan, M. (2020). Oil Rents and Greenhouse Gas Emissions: Spatial Analysis of Gulf Cooperation Council Countries. *Environment, Development and Sustainability*, https://doi.org/10.1007/s10668-020-00869-w

Mahmood, H., Furqan, M., Bagais, O.A. (2019). Environmental accounting of financial development and foreign investment: spatial analyses of East Asia. *Sustainability* 11(1): 0013.   https://doi.org/10.3390/su11010013

Mahmood, H., Maalel, N., Zarrad, O. (2019). Trade Openness and CO_2 Emissions: Evidence from Tunisia. *Sustainability* 11(12): 3295. https://doi.org/10.3390/su11123295

Moutinho, V., Varum, C., Madaleno, M. (2017). How Economic Growth Affects Emissions? An Investigation of the Environmental Kuznets Curve in Portuguese and Spanish Economic Activity Sectors. *Energy Policy* 106: 326-344. https://doi.org/10.1016/j.enpol.2017.03.069

Ng, S., Perron, P. (2003). Lag Length Selection and the Construction of Unit Root Tests with Good Size and Power. *Econometrica* 66: 1519-1554. https://doi.org/10.1111/1468-0262.00256

Omri, A., Euchi, J., Hasaballah, A., Al-Tit, A. (2019). Determinants of Environmental Sustainability: Evidence from Saudi Arabia. *Science of the Total Environment* 657(1): 1592-1601. https://doi.org/10.1016/j.scitotenv.2018.12.111

Pangarso, A., Astuti, E.S., Raharjo, K., Afrianty, T.W. (2020). The impact of absorptive capacity and innovation ambidexterity on sustainable competitive advantage: the case of Indonesian higher education. *Entrepreneurship and Sustainability Issues* 7(3): 2436-2455. https://doi.org/10.9770/jesi.2020.7.3(65)

Pesaran, M.H., Shin, Y., Smith, R.J. (2001). Structural analysis of vector error correction models with exogenous I(1) variables. *Journal of Econometrics* 97(2): 293-343. https://doi.org/10.1016/S0304-4076(99)00073-1

Ponce, P., Alvarado, R., Ponce, K., Alvarado, R., Granda, D., Yaguana, K. (2019). Green Returns of Labor Income and Human Capital: Empirical Evidence of the Environmental Behavior of Households in Developing Countries. *Ecological Economics* 160: 105-113. https://doi.org/10.1016/j.ecolecon.2019.02.012

Prasetyo, P.E., Kistanti, N.R. (2020). Human capital, institutional economics and entrepreneurship as a driver for quality & sustainable economic growth. *Entrepreneurship and Sustainability Issues* 7(4): 2575-2589. https://doi.org/10.9770/jesi.2020.7.4(1)

Qudrat-Ullah, H., Kayal, A. (2018). How to Improve Learners' (MIS) Understanding of CO_2 Accumulations through the Use of Human-Facilitated Interactive Learning Environments. *Journal of Cleaner Production* 184: 188-197. https://doi.org/10.1016/j.jclepro.2018.02.244

Shields, R. (2019). The Sustainability of International Higher Education: Student Mobility and Global Climate Change. *Journal of Cleaner Production* 217: 594-602. https://doi.org/10.1016/j.jclepro.2019.01.291

Taylor, A., Curnow, R., Fletcher, T., Lewis, J. (2007). Education Campaigns to Reduce Stormwater Pollution in Commercial Areas: Do They Work? *Journal of Environmental Management* 84: 323-335. https://doi.org/10.1016/j.jenvman.2006.06.002

UNESCO (2015). *Unpacking Sustainable Development Goal 4 Education 2030*. [Online] Available at: https://www.campaignforeducation.org/docs/post2015/SDG4.pdf [Accessed November 2019].

World Bank (2019). *World Development Indicators*. Washington, D.C.: The World Bank.

Yang, G., Sun, T., Wang, J., Li, X. (2015). Modeling The Nexus between Carbon Dioxide Emissions and Economic Growth. *Energy Policy* 86: 104-117. https://doi.org/10.1016/j.enpol.2015.06.031

Yao, Y., Ivanovski, K., Inekwe, J., Smyth, R. (2019). Human Capital and Energy Consumption: Evidence from OECD Countries. *Energy Economics* 84: 104534. https://doi.org/10.1016/j.eneco.2019.104534

Zafar, M.W., Zaidi, S.A.H., Khan, N.R., Mirza, F.M., Hou, F., Kirmani, S.A.A. (2019). The Impact of Natural Resources, Human Capital, and Foreign Direct Investment on the Ecological Footprint: The Case of the United States. *Resources Policy* 63: 101-114. https://doi.org/10.1016/j.resourpol.2019.101428

Zamil, A.M.A., Furqan, M., Mahmood, H. (2019). Trade Openness and CO_2 emissions nexus in Oman. *Entrepreneurship and Sustainability Issues* 7(2): 1319-1329. https://doi.org/10.9770/jesi.2019.7.2(36)

Appendix: Data utilized

Years	PE	SE	EC	Y
1971	4.4007	1.390918	2.282701	10.14711
1972	4.387549	1.436655	2.398055	10.30667
1973	4.375846	1.51886	2.651105	10.47429
1974	4.359959	1.619673	2.638635	10.57453
1975	4.345205	1.702433	2.417532	10.43
1976	4.321802	1.827392	2.564046	10.54284
1977	4.301127	1.930745	2.664198	10.5599
1978	4.283999	2.023311	2.585083	10.45327
1979	4.273786	2.053088	2.711252	10.50989
1980	4.280612	2.050359	2.855986	10.50556
1981	4.275324	2.123621	2.828996	10.46251
1982	4.267124	2.158112	2.660919	10.16654
1983	4.259132	2.187583	2.616691	9.928804
1984	4.250684	2.210477	2.523505	9.821573
1985	4.246009	2.233796	2.571894	9.663626
1986	4.243823	2.247969	2.692762	9.770474
1987	4.24539	2.263852	2.574816	9.655587
1988	4.243145	2.306486	2.592662	9.736343
1989	4.235018	2.332041	2.55962	9.692428
1990	4.228099	2.359083	2.431879	9.798279
1991	4.210477	2.39737	2.764713	9.90551
1992	4.192902	2.409516	2.79911	9.914766
1993	4.168904	2.467416	2.866264	9.873739
1994	4.144617	2.537874	2.822469	9.854353
1995	4.124795	2.618645	2.529832	9.83354
1996	4.095164	2.714692	2.604525	9.838671
1997	4.060385	2.809294	2.405685	9.830288

1998	4.033969	2.869264	2.346163	9.839673
1999	4.017015	2.910761	2.41222	9.780807
2000	4.009868	2.942841	2.660279	9.812645
2001	3.992556	2.981106	2.635577	9.774824
2002	3.999587	2.992451	2.70137	9.718328
2003	4.003101	3.019549	2.674773	9.795621
2004	3.996544	3.066648	2.835599	9.84282
2005	3.982669	3.09432	2.811437	9.868343
2006	3.972123	3.092021	2.868271	9.868096
2007	3.958102	3.110805	2.731505	9.859335
2008	3.949648	3.133584	2.808378	9.893069
2009	3.944886	3.165514	2.867308	9.844857
2010	3.933952	3.199749	2.939445	9.865764
2011	3.930469	3.20588	2.873695	9.931856
2012	3.936774	3.186728	2.966278	9.954957
2013	3.934316	3.199735	2.894162	9.952516
2014	3.936171	3.17789	2.971914	9.960976

Tarek Tawfik Yousef ALKHATEEB
ORCID ID: https://orcid.org/0000-0001-8215-9522

Haider MAHMOOD
ORCID ID: https://orcid.org/0000-0002-6474-4338

Maham FURQAN
ORCID ID: https://oricid.org/0000-0002-6275-5447

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:
@Entrepr69728810

_____
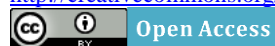
DEVELOPMENT OF ENTREPRENEURSHIP AND FORMS OF SELF-EMPLOYMENT IN THE INNOVATIVE SECTORS OF THE ECONOMY

Bakyt Beknazarov [1], Roza Niyazbekova [2], Ussen Amirseitov [3], Aiganym Kokenova [4], Marzhan Daurbayeva [5], Madina Aitkazina [6]

[1,2,5] *M. Auezov South Kazakhstan State University, Tauke Khan Avenue, 5, Shymkent, 160012, Kazakhstan*
[3] *Silkway International University, Tokaev Street 27 "A", Shymkent, 160011, Kazakhstan*
[4] *International Humanitarian and Technical University, Baitursynov Street, 80a, Shymkent, 160021, Kazakhstan*
[6] *Narxoz University, Zhandosov Street, 55, Almaty, 050035, Kazakhstan*

Abstract. The goal of this study is to identify the problems and barriers that impede the growth and development of small and medium innovative enterprises (innovative SMEs) and suggest ways to overcome them. The main methods of the study include a survey of the founders of innovative companies from Russia and Belarus, as well as expert interviews. The study involved both mature companies and startups. The results of the study indicate that most innovative companies lack personnel with the necessary education and experience. At the same time, the number of researchers is decreasing, and external part-timers are being involved to carry out the research. The innovative activities in the countries under study remain low. The main barriers to the growth of this indicator include the lack of financial resources, the difficulties with raising external financing, as well as the shortage of the professional personnel. A set of measures to financially encourage researchers and tax incentives for innovative entrepreneurship are proposed as the main incentives to increasing the innovative activities.

1. Introduction

There has been an increase in investment in innovation worldwide in recent years; the use of intellectual property has reached record levels (The Global Innovation Index 2019). According to Eurostat, R&D expenses increased by 53.5 % in the EU member states, by 65 % in the US, and almost 2.9 times in South Korea for 2009 – 2017 (Eurostat, 2020a).

Most of the global R&D expenses were in the business sector. The share of private sector investment in R&D amounted to 61.2 % of the total R&D expenses in the EU member states, 73 % in the US, 78.8 % in Japan, and 79.4 % in South Korea in 2017.

SMEs have traditionally been recognized as the driving force behind growth and innovation in the economy. For example, the business sector of the EU member states (27) accounts for 66.4 % of the total domestic R&D expenses (Eurostat, 2020b). The European business sector employs 51.3 % of the total R&D personnel (Eurostat, 2020c).

Despite the relatively small R&D budget, a third of the annual patent applications at the European Patent Office are filed by innovative SMEs (Patent Index 2019).

However, the level of innovative activities of SMEs in middle-income countries, including Russia, Kazakhstan, and Belarus, is significantly lower than that in high-income countries. For example, about 72 % of the total number of SMEs are introducing a new product or business process in Sweden, 71 % in Norway, 67 % in Belgium, 64 % in the US, and 62 % in Germany. This indicator is about 5 % in the Russian Federation (OECD, 2020), 7.2 % in Kazakhstan (On the innovative activities of enterprises in the Republic of Kazakhstan, 2018), and 4.3 % in the Republic of Belarus (National Statistical Committee of the Republic of Belarus, 2018).

Small businesses trying to market the innovative technology products and services often face unique problems and barriers that large multinational corporations do not face, and they often need to overcome such barriers with fewer resources (Bushueva, et. al. 2020). The shortage of human resources is a particular problem for SMEs, because the number of specialists who are knowledge holders and have the necessary competencies and experience in innovations is extremely limited (Dudin et al. 2020).

Encouraging employment in the innovative sector and encouraging youth to start their own businesses and to create breakthrough technology become important measures to expand the innovative activities of SMEs (Muraya, et. al. 2019). Significant potential for attracting personnel to innovative areas lies in the development of new forms of employment. For example, such forms of employment as freelancing, self-employment with hired workers, etc. are becoming more common in European countries (Danilina, et. al. 2020)

The problems faced by individual entrepreneurs and fast-growing SMEs when trying to commercialize an innovative product or service have been examined in this study.

The hypothesis has been formulated during the study that the encouragement of the forms of self-employment and the creation of new SMEs in research and innovation are flexible tools for the growth of innovative activities and are vital for the economic growth of countries with developing economies.

2. Literature review

Innovations represent the introduction of a new or significantly improved product (goods or services), a process, a new marketing method, or a new organizational method in business practice, workplace organization, or external relations (Mohd Rosli & Syamsuriana Sidek 2013).

Many studies confirm the positive impact of innovation on business performance (Galindo & Méndez-Picazo 2013; Saiz-Álvarez, et. al. 2013; Lucchese & Pianta 2012; Wang et al. 2019; Kumar, 2019; Laužikas, Miliūtė, 2020).

It is important to note that new products and services must be commercialized, i.e., marketed in order to be considered innovations (Klyver, et. al. 2012). Innovative entrepreneurship is one of the main means by which new knowledge and technology are transformed into economic and social benefits (Baumol 2010).

A significant share of the works in the contemporary scientific literature is devoted to studying the degree of influence of innovative entrepreneurship on the socioeconomic development of a country (De la Hoz-Rosales, et. al. 2019; Acs, et. al. 2012; Aparicio, et. al. 2016; Karshalova, et. al. 2017), the factors that determine innovative behavior and the offer of new products by SMEs (Velilla & Ortega 2020; Castaño, et. al. 2015), and the innovative entrepreneurial education (Lee, et. al. 2020; Chen, et. al. 2018).

Financing problems (Li, et. al. 2015; Giraudo, et. al. 2019; Bertoni, et. al. 2019; Colombo, et. al. 2013; Giudicic, et. al. 2018), patent protection issues and incentives for investment in innovative startups (Cumming, et. al. 2017; Grilli, et. al. 2018), and government support measures (Ruchkina, et. al. 2017; Mas-Tur & Simón 2015; Grilli, et. al. 2018) for young innovative companies are some of the relevant areas of research.

The development of innovative entrepreneurship and the digital transformation of the society have led to the emergence of new forms of work that are significantly different from standard labor relations. Certain aspects of the development of new employment forms in SMEs are reviewed in the works of Orlova (2017), Kirchhoff (2007), Serrano (2010), Alois (2020), and others.

The studies indicate that the forms of employment based on open and temporary contracts, freelancers, and self-employment with hired workers are gaining popularity in the world now (Eurofound, 2018).

The study of the scientific literature reveals that there have been relatively few empirical data around the world until recently to answer the question about the participation of SMEs and self-employed workers in the development of an innovative economy. The early studies relied on data from officially registered companies, leaving informal forms of employment, which in many countries were the largest source of employment, out of the picture.

As such, the problems of entrepreneurship development and self-employment in innovative sectors of the economy remain poorly explored.

3. Methods

The trends based on the opinions and intentions of the population and the heads of SMEs, describing the dynamics and scale of innovative processes, factors constraining innovative activities, and barriers to the development of innovative entrepreneurship have been revealed in the course of a specially organized market observation.

The key questions addressed in this study are the following: how innovative are SMEs in various sectors and by international standards? Why and when do SMEs invest in research and innovation? Where are the barriers and potential for research and innovation?

A methodology was developed to accomplish these tasks, which included the collection and analysis of primary qualitative and quantitative data. A random sample was made for the survey to ensure that the opinions expressed during the survey were representative.

The goals of sampling included maximizing the number of responses and ensuring the representativeness of the population and SME enterprises. The survey was conducted online.

The experts were selected based on the professional status of a person. They included people whose professional activities were related to the relationship between the institute of entrepreneurship for more than two years. The sample included two groups of respondents: 516 respondents from the population of three countries in the post-Soviet space (Kazakhstan, Russia, and Belarus) and 244 SMEs engaged in innovative activities.

During the study, the SMEs were asked to evaluate their satisfaction with various aspects of their development. The evaluations had to be given on a 10-point scale, where 1 meant absolute dissatisfaction, 10 meant absolute satisfaction, and 0 meant that this indicator was not significant for the company development or difficult to evaluate.

In addition, the respondents could choose multiple answers for some questions. The substantiated answers were obtained from the generalized comments of the respondents.

All participants were warned about the purpose of the survey and that the study organizers were planning to publish the generalized results of the study in the future. All expert quotes were provided in the article anonymously. The experts chose the language they answered the question (Russian or English) themselves.

4. Results

The average age of the SMEs participating in the survey is 2.5 years. The main share is made up of the companies created less than one year ago (Figure 1).
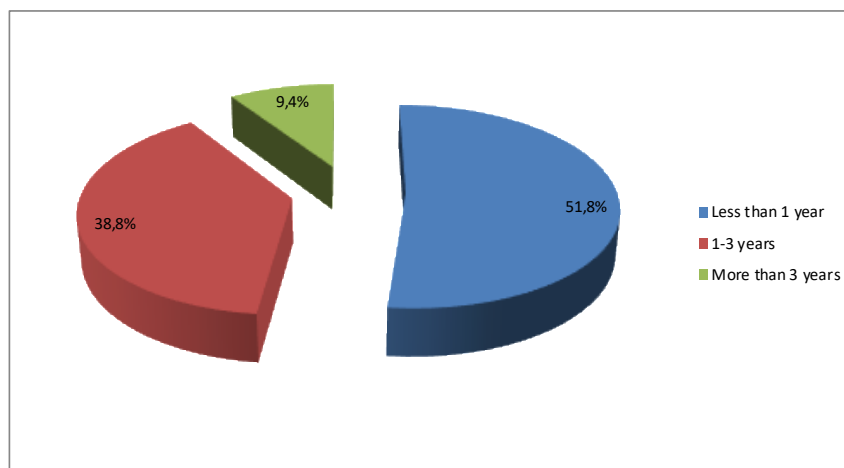
Figure 1. Age structure of the SMEs participating in the survey, % of the total number of respondents

The largest share of the enterprises surveyed (52.7 %) are research organizations and higher education organizations (22.3 % of the respondents). The companies surveyed in the three countries do not have significant differences, depending on the type of business (Figure 2).
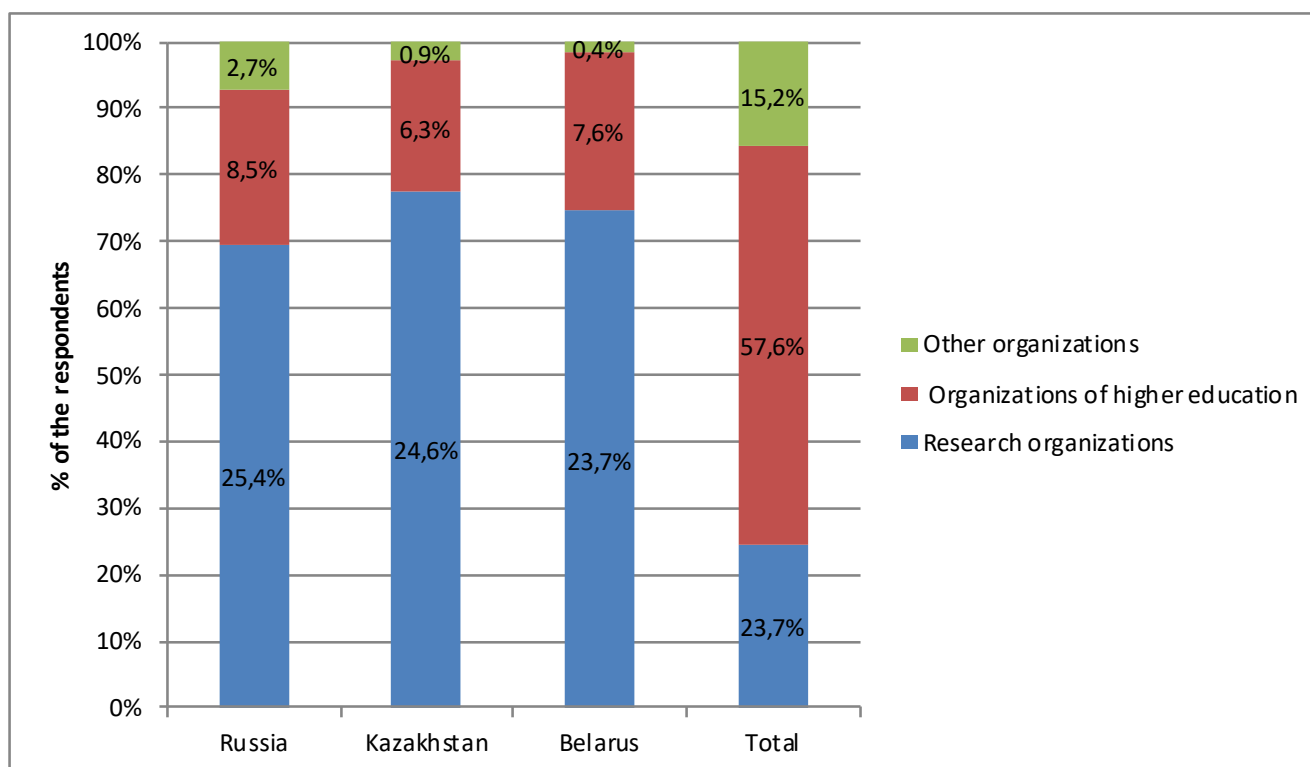
Figure 2. Structure of the innovative SMEs, % of the total number of respondents

The areas of activity of the SMEs participating in the survey are quite diverse. For example, almost half of the experts surveyed represent the telecommunications, media, and technology sector (Figure 3). About 22.8 % of the surveyed companies work in the biotechnology and pharmaceutical sectors, 16.1 % of the companies participating in the survey create technological solutions for specific industries, 10.3 % create innovations in instrument engineering, and the remaining 4 % of the innovative companies specialize on the developments for the consumer sector and education.
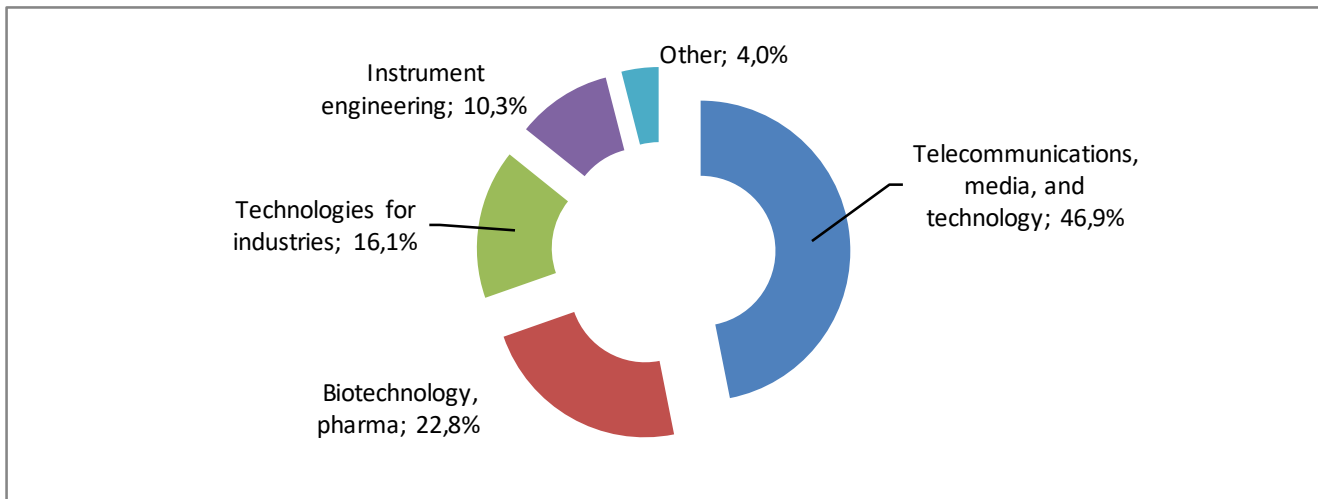
Figure 3. Structure of the respondents by field of activities, %

The vast majority of the companies participating in the survey are mature. At the same time, 10.7 % of the experts noted that their company was at the stage of the stable product monetization. Most of the companies surveyed are in the business scaling stage, i.e., according to experts, their enterprise is able to cope with an increase in the volume of work or output in a cost-effective and reasonable way at the current stage of development (Figure 4).

The share of mature innovative enterprises is at approximately the same level and amounts to 22.3 % in Russia and 21 % in Kazakhstan. This indicator is slightly lower in Belarus and amounts to 16.9 % of the total number of innovative companies.
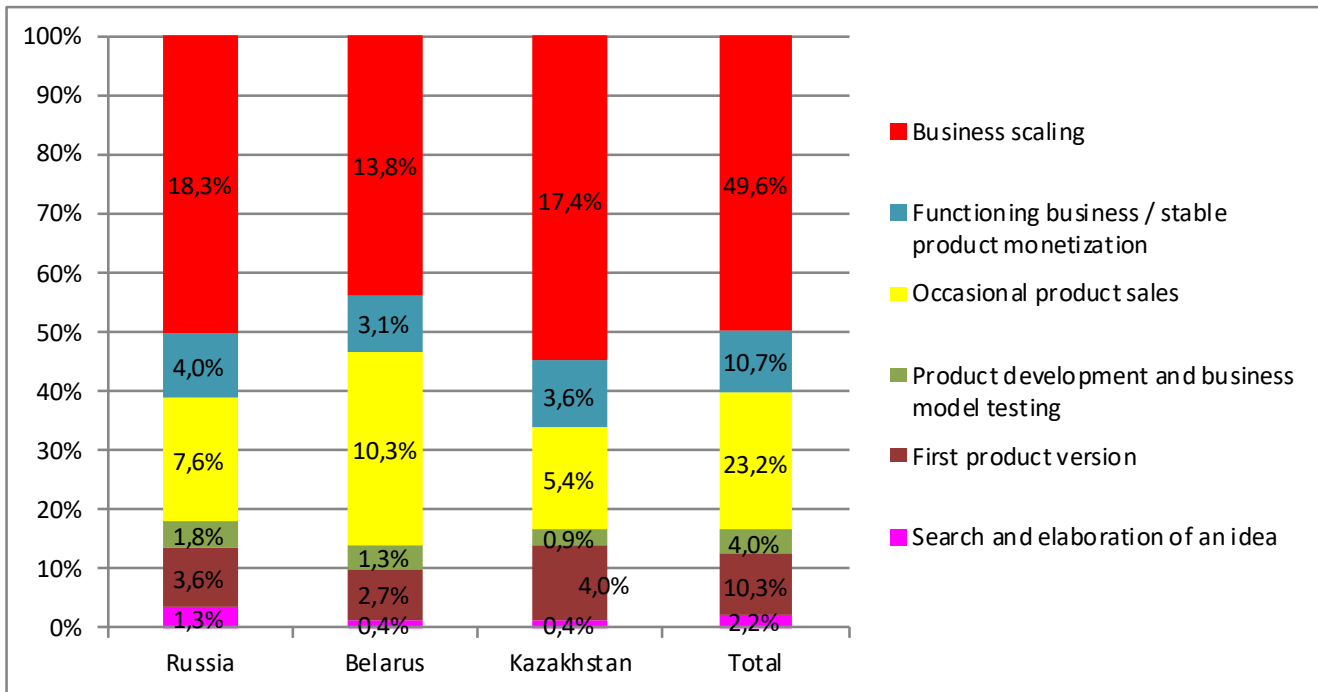
Figure 4. Structure of the respondents by the stage of development of innovative activities, % of the respondents

About 17 % of the companies surveyed are currently at the startup stage and have no revenue, while the annual revenue of 27 % of the companies is less than USD 15,000. The distribution of respondents by average annual revenue is provided in Figure 5.
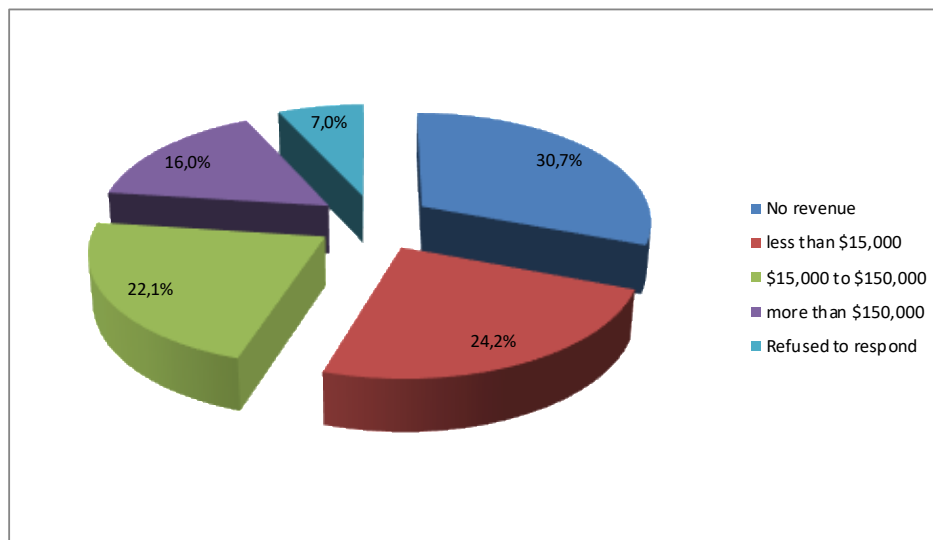
Figure 5. Distribution of the respondents by annual revenue for the previous year, % of the respondents

The experts were asked to evaluate the degree of their innovations during the study. For example, the majority (43.3 %) of the companies say that their product is an improvement in innovation. More than a third of the companies surveyed (37.9 %) describe their products as having advantages and disadvantages over peers, but not being significantly better. Radical innovations are created by 17 % of the companies that offer fundamentally new solutions and provide a technological breakthrough. The distribution of the expert opinions on the level of innovation of their products or services is presented in Figure 6.
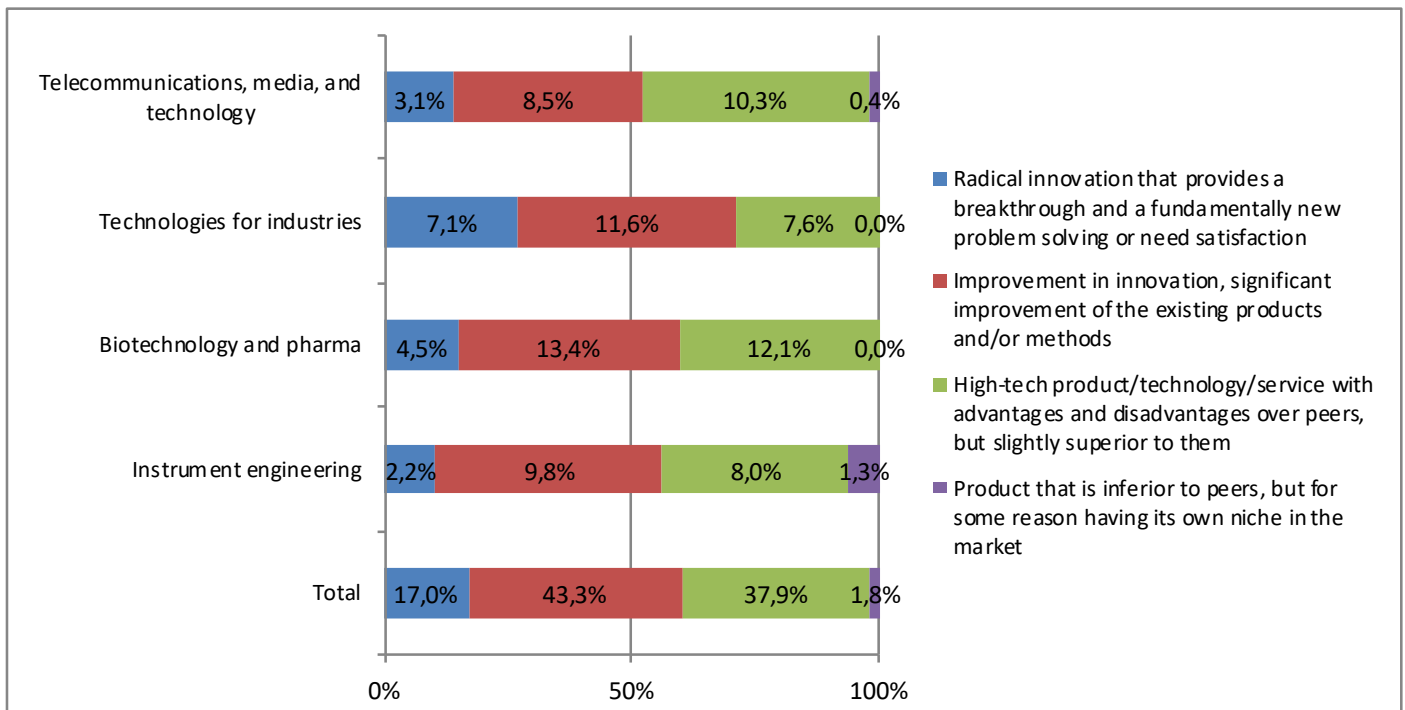
Figure 6. Distribution of the expert opinions on the level of innovation of their products or services

The managers of almost 62 % of the surveyed SMEs indicated an increase in internal spending on R&D over the previous three years (Figure 7).
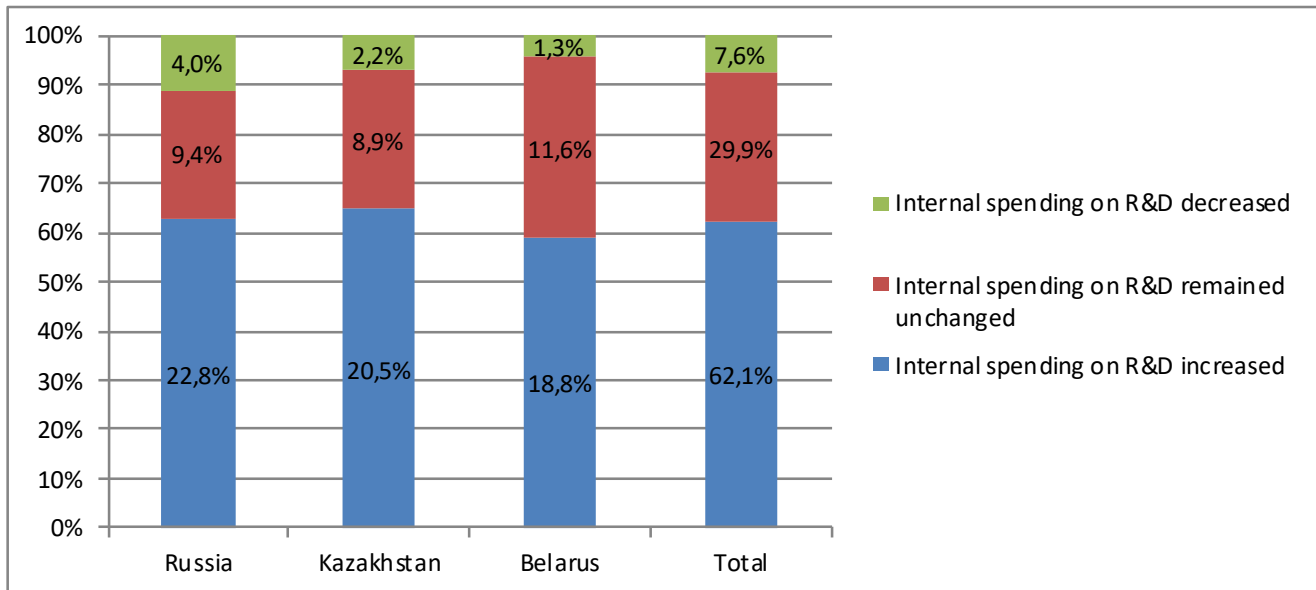
Figure 7. Evaluation of internal spending on R&D, % of the respondents

The total number of the personnel in the surveyed organizations was 5,824 people. As such, the average number of employees in innovative SMEs is 26 people.

The results of the study indicate that the companies with up to five full-time employees dominate in the innovative sector today, their largest part being from Russia. Most of the innovative companies from Kazakhstan and Belarus participating in the study have full-time personnel of six to 20 people. Almost every fourth company employs from 21 to 50 people. The distribution of the innovative companies among the three countries by the number of personnel is presented in Figure 8.
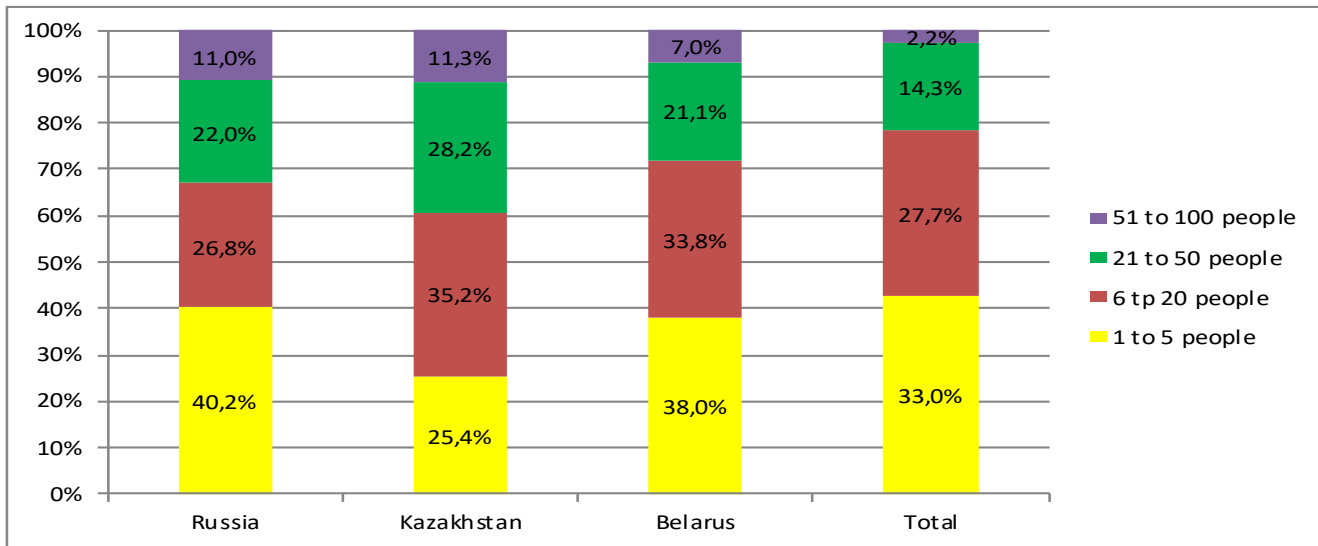
Figure 8. Structure of innovative enterprises by the number of personnel

About 90 % of the respondents say that about half of the personnel in their organizations are researchers. At the same time, 178 respondents (79.8 % of the respondents) noted that the number of researchers had decreased over the previous three years, 16.5 % of the experts said that the number of researchers remained the same, and only 3.7 % noted an increase in this indicator. At the same time, similar trends in the decrease in the number of researchers employed by innovative enterprises are observed in Russia, Belarus, and Kazakhstan.

The widespread part-time format is an interesting feature of the labor market in the innovative sector. Almost half of the experts (48.7 %) from the SME managers note that they involve external part-timers and researchers under civil law contracts to carry out the research work.

The structure of employment of part-timers in innovative companies in Russia, Belarus, and Kazakhstan is similar: the majority of part-timers work in science and education and in the high-tech industry (Figure 9).
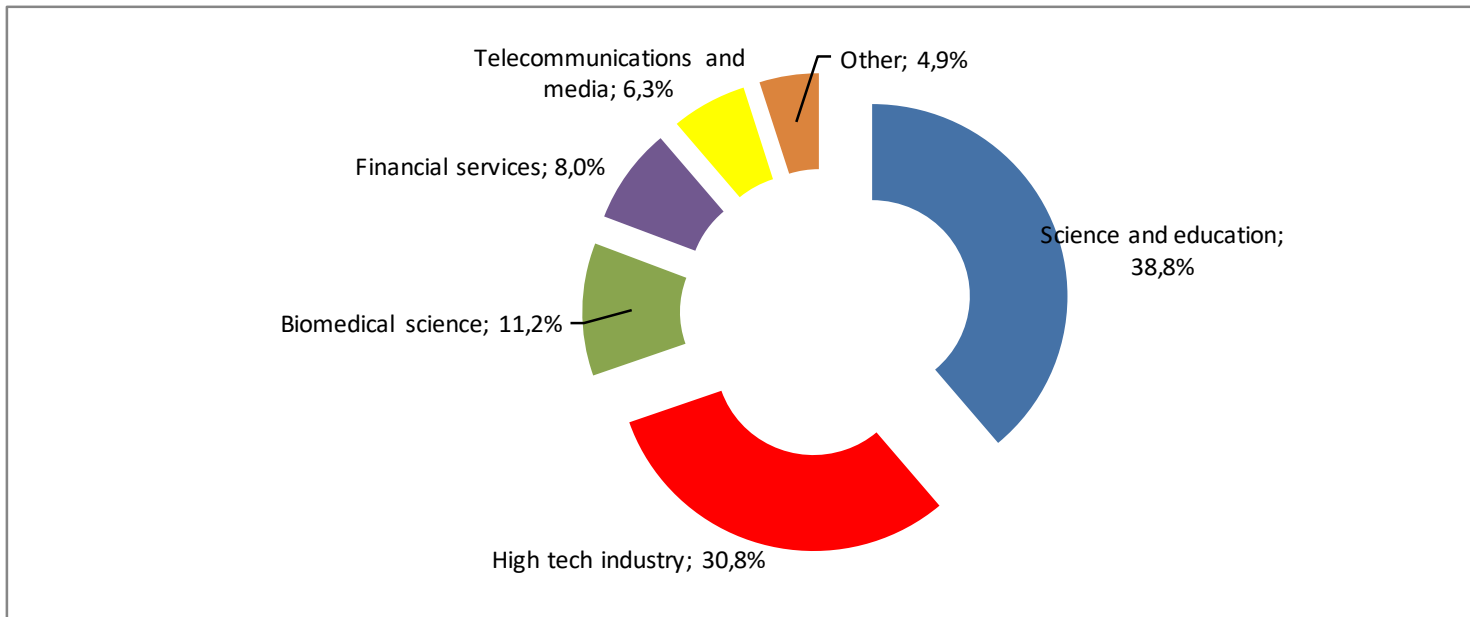
Figure 9. Employment structure of part-timers in innovative companies, % of the respondents

About 58 % of the experts noted that self-employed workers (freelancers) were involved in the development of individual topics, projects, as well as for the performance of certain works or provision of certain services.

One expert from the high-tech industry noted that R&D freelancers were involved in research that did not require experiments at scientific laboratories and the use of sophisticated equipment.

According to the expert, it is easier and cheaper to find a qualified freelancer for a one-time project than to adapt a new employee today.

The managers of more than 40 % of the companies noted that independent experts were involved in the implementation of individual projects. The most popular freelance professions involved in innovative projects are "web and mobile design", "development of other software", "development of desktop software", "e-commerce development", "product management", and "Q&A testing".

It must be noted that, despite the possibility of hiring part-timers in the innovative sector, more than half of the innovative companies (51.8 %) lack staff with the necessary education and experience.

The companies feel the particularly acute lack of specialists in the following activities: promotion, sales, and PR were indicated by 58.6 % of the innovative companies experiencing staff shortages; research and analytics (52.6 %); information technology (45.7 %); and strategic management (44 %).

At the same time, staff shortages are not a critical problem for the research participants in the development of their activities. The experts name a shortage of financial resources, difficulties in raising external financing, as well as a shortage of professional personnel as the main obstacles to the growth of the innovative activities of the population and SMEs (Figure 10).
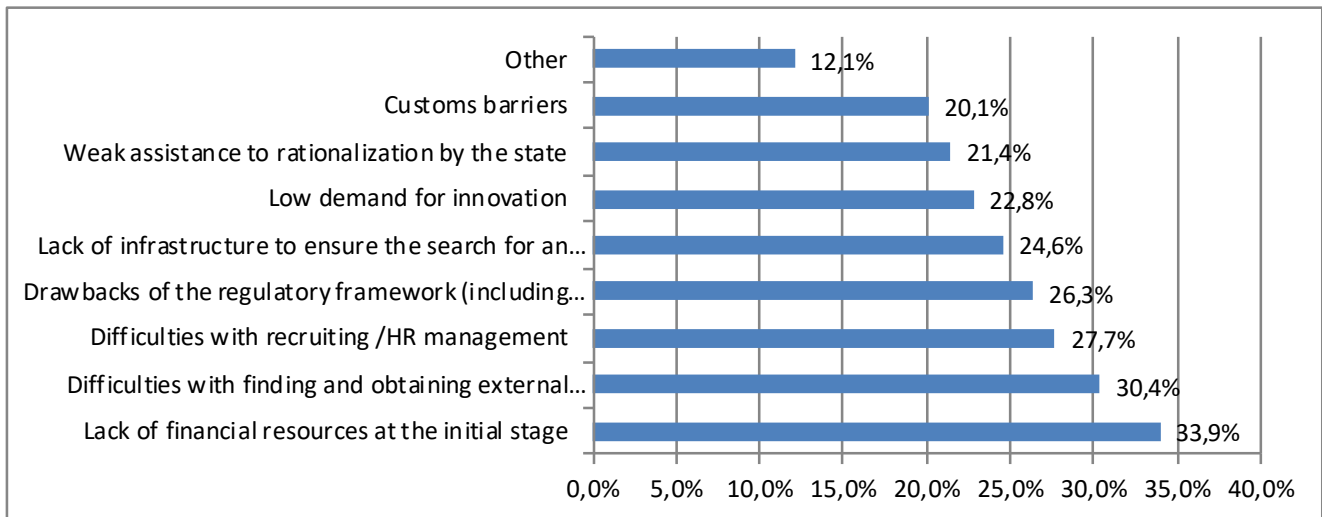
Figure 10. Barriers to increase innovative activities, % of the respondents

The analysis of expert opinions indicates that the relevance of barriers depends on the stage of development of an innovative product and/or technology.

For example, the main problems at the startup stage are the lack of funding and the difficulties of translating the idea into a product and the difficulty of obtaining external financing. More mature enterprises are more likely to experience difficulties associated with business growth, staff shortages, and the organization of internal processes.

5. Discussion

The results of the study reveal that many aspects of the development of innovative ecosystems in Russia, Belarus, and Kazakhstan are quite similar and generally do not correspond to the scientific and technological potential. The development of innovative SMEs in the three countries has common problems: the limited access to financing, the low motivation for innovative activities, and the lack of personnel with the necessary level of education and experience. This is generally consistent with the results of studies on entrepreneurship issues (Biryukov, et. al. 2020; Suglobov, et.al. 2020; Dudin et al. 2020; Krasnov, et. al. 2019). However, attention should be paid to some important issues.

The vast majority of the experts (89.7 %) expressed the view that the development of innovative entrepreneurship depended on the efficient measures aimed at encouraging the inventive activities of the population and at creating favorable conditions to reduce the shortage of professional and experienced personnel in innovative companies.

Three quarters of the experts agree that financial support measures for inventors and tax incentives are the main incentives for innovative activities (Figure 11).
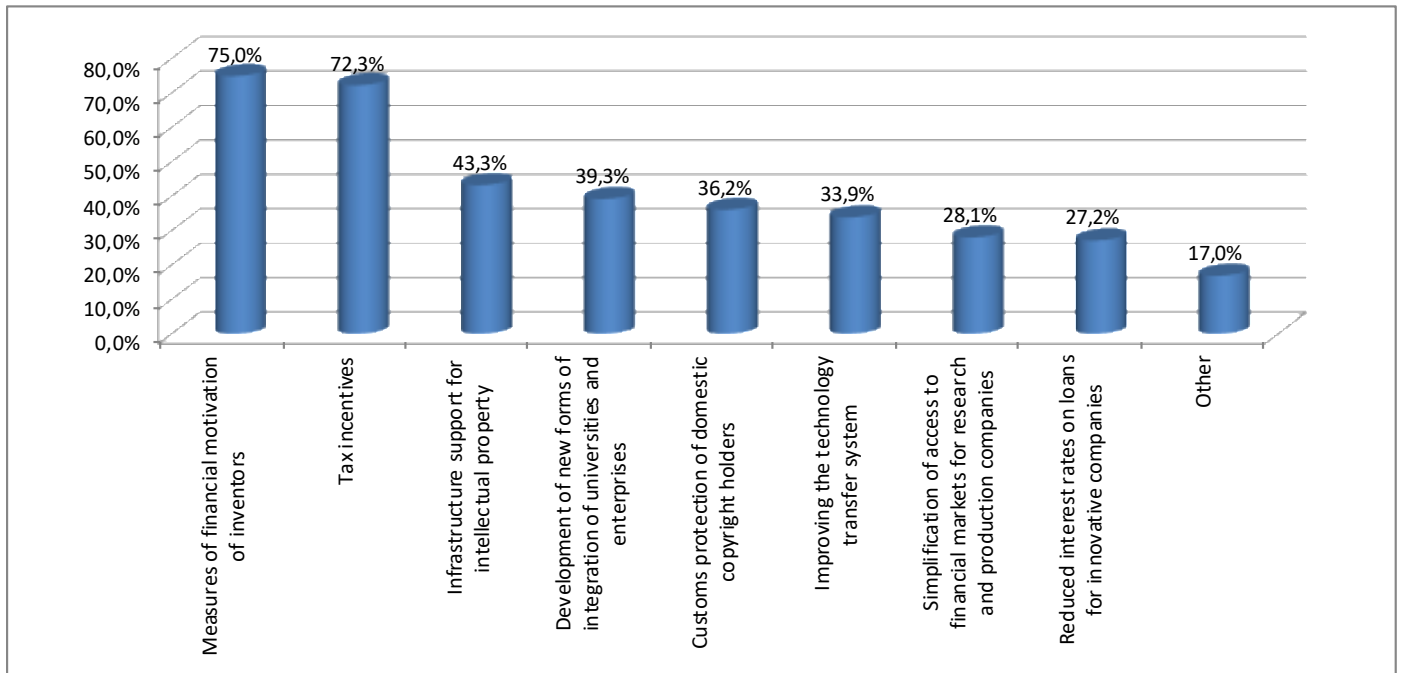
Figure 11. Incentives for innovative activities of the population, %

The experts name the need for legislative consolidation of the responsibility of employers for the late payment of remuneration to the inventors, as well as establishing minimum amounts for paying for the creation of intellectual property results as the priority measures aimed at enhancing the financial motivation of inventors (Figure 12).
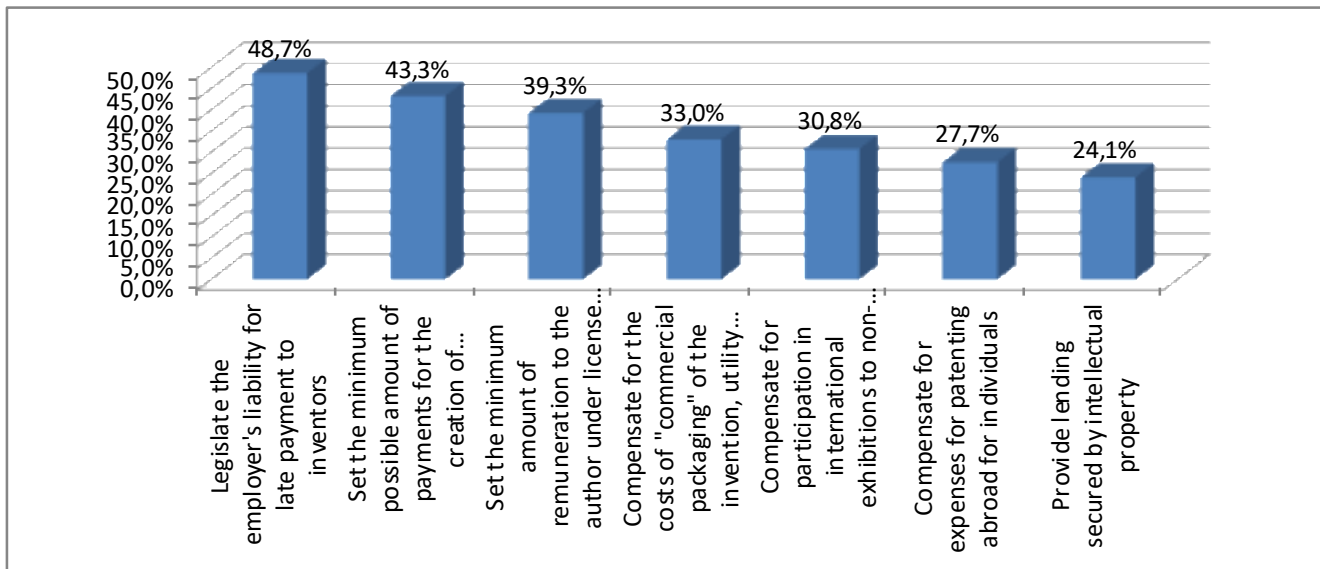
Figure 12. Priority measures to enhance the financial motivation of inventors

The rules for the payment of remuneration to the authors of employee inventions, utility models, and industrial designs are currently established at the legislative level in the countries under study. However, the need to conclude special agreements and the lack of responsibility for nonpayment of such remuneration established at the legislative level discourage employees of universities, research institutes, and innovative companies.

In the course of the interview, the experts proposed introducing standards into national laws providing for the procedure for paying remuneration for the creation of intellectual property results and the commercialization of inventions, models, and industrial designs.

About half of the experts (48.7 %) consider it necessary to consolidate the responsibility of employers for the late payment of remuneration to the inventors at the legislative level, and 43.3 % of the respondents spoke in favor of setting the minimum amount of payments for creating the intellectual activity results. About 39.3 % of the respondents note the possibility of establishing the minimum amount of remuneration to the author or the team of authors in the event of the conclusion of a licensing agreement between the employer and the third party for the right to use an employee invention.

A third of the experts surveyed (33 %) noted the need for a mechanism to offset the costs of "commercial packaging" of the invention.

The mechanism of an innovative voucher can solve this problem. The experts proposed to study the innovate experience of the EU member states and to prepare the necessary regulatory framework in order to launch the mechanism for using innovative vouchers. Innovative vouchers provide firms with a financial incentive on a noncompetitive basis (as opposed to cooperative R&D grants) to introduce small-scale innovations by establishing links between the SMEs and the state research institutions. They serve the dual purpose of directly encouraging the exchange of knowledge and of building long-term relationships between the industry and the knowledge providers. Voucher schemes provide small amounts of the state subsidies to the SMEs to help them access external support to develop specific competencies. An analysis of international experience in applying voucher schemes suggests that they can help SMEs increase their innovative potential and overcome specific barriers to their development, such as risk aversion.

Slightly less than a third of the experts (31.8 %) note that there are no mechanisms allowing inventors to participate in exhibition and forum events abroad on favorable terms today. They offer to extend the mechanism of cost compensation for the participation in such events as measures of financial motivation.

About 27.7 % of the experts believe that the rules for compensation for the costs for patenting abroad in force in the countries under consideration do not apply to individuals. They noted the need to include these rules in the program to support the export of intellectual property rights.

Almost a quarter of the experts (24.1 %) propose creating a mechanism similar to the deposit insurance system, which will allow banks to lend against intellectual property while insuring the risks in insurance companies.

Tax incentives were mentioned by 72.3 % of the experts as a motivation for the development of innovative entrepreneurship. The experts propose the abolition of VAT, the introduction of a multiplier for the costs of patent services, tax exemptions for transactions with intellectual property rights, and the payment of compensation through taxation of the expenses for patenting abroad as the main tax incentives (Figure 13).
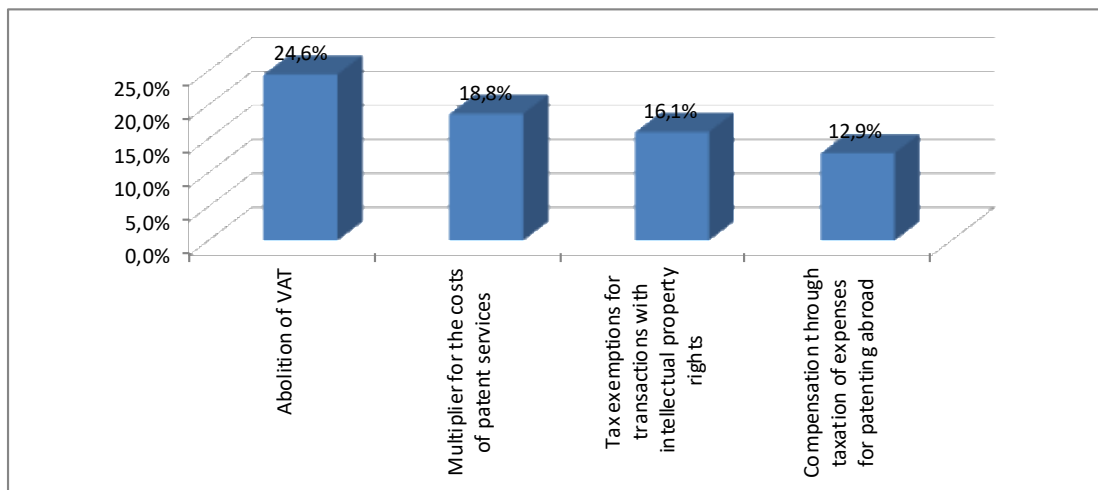
Figure 13. Tax incentive measures, % of the respondents

The existing VAT collection schemes in Russia, Belarus, and Kazakhstan create a barrier between the innovative SMEs and the large companies that require "input" VAT. The experts (24.6 %) made a proposal to replace VAT on products manufactured in the countries under study with sales tax. This will allow to transfer the tax burden to the retailer without budgetary losses as the final link in the production and sale chain.

Due to the postponed economic effect of inventive activities, there are currently no patent services in the structure of many companies. About 18.8 % of the respondents suggested that the costs associated with the maintenance of patent offices should be attributed to the production costs for income tax purposes.

More than 16 % of the experts identified exemption from taxation on the transactions related to the payment of author's royalties, sale of rights under license agreements, and sale of exclusive rights to inventions as incentive measures.

The experts indicated infrastructure support for intellectual property (43.3 %), the development of new forms of integration of universities and industrial enterprises (39.3 %), customs protection of domestic copyright holders (36.2 %), and improving the technology transfer system (33.9 %) almost twice less often than the financial support for authors and tax incentives.

As such, it can be stated with great confidence that the application of the above incentive measures in combination with the efficient mechanisms for creating a market for new inventions will create favorable conditions for the development of entrepreneurship and forms of self-employment in innovative sectors of the economy.

Conclusion

The results obtained in the course of this study have confirmed the hypothesis and are an important step towards the formation of a comprehensive identification of the existing innovative landscape in the three countries of the EAEU integration association and the development of directions for its development.

Despite the available innovative potential, the level of innovative activities remains quite modest. The main barriers to the development of innovative entrepreneurship are the lack of financial resources, the unforeseen expenses, processes, etc., and difficulties in raising the external financing.

The main measures to encourage the innovative activities of the population in the EAEU member states include financial incentives for inventors, tax incentives, infrastructural support for intellectual property results, development of new forms of integration of universities and enterprises, customs protection of domestic copyright holders, and improvement of technology transfer systems.

References

Acs, Z.J., Audretsch, D.B., Braunerhjelm, P. & Carlsson, B. (2012). Growth and entrepreneurship. Small business Economics, 39(2), 289-300. https://doi.org/10.1007/s11187-010-9307-2

Aloisi, A. & De Stefano, V. (2020). Regulation and the future of work: The employment relationship as an innovation facilitator. International Labour Review. Retrieved from: https://www.scopus.com/inward/record.uri?eid=2-s2.0-5083464570&doi=10.1111%2filr.12160&partnerID=40&md5=af18faf7e8dd3efcb942dfb39d28f38e

Aparicio, S., Urbano, D. & Audrech D. (2016). Institutional factors, entrepreneurship opportunities, and economic growth: panel evidence data. Technological forecasting and social change, 102, 45-61. https://doi.org/10.1016/j.techfore.2015.04.006

Baumol, W.J. (2010). The Microtheory of Innovative Entrepreneurship, Princeton: Princeton University Press, pp. 246.

Bertoni, F., D'add, D. & Grilli, L. (2019). Independent choice of entrepreneurial firms in thin venture capital markets: theory and empirical data. Journal of strategic entrepreneurship, 13(1), 47-74.

Biryuko, V.V., Dmitrieva, O.V., Frolova, V.B., Nikandrova L.K. & Arkhipov, A.B. (2020). Formation of a Tourism Entrepreneurial Environment in the Conditions of Competition. Journal of Environmental Management and Tourism, 10(8), 1779-1784.

Bushueva, L.I., Popova, Y.F. & Shikverdiev, P.A. (2020). Factor analysis of administrative barriers to entrepreneurial activities. Revista Inclusiones, 7(2), 242-254.

Castaño, M.-S., Méndez, M.-T. & Galindo, M.-Á. (2015). The effect of social, cultural, and economic factors on entrepreneurship. Journal of Business Research, 68(7), 1496-1500. https://doi.org/10.1016/j.jbusres.2015.01.040

Chen, Y., Cao, J., Zhang, Y., Liu, C. & Zhou, B. (2018). Research on Value and Development Strategy of Innovative Entrepreneurship Education in Colleges and Universities of China. 2018 International Conference on Humanities and Advanced Education Technology (ICHAET 2018), pp. 8-14.

Colombo, M. G., Giannangeli, S. & Grilli, L. (2013). Public subsidies and employment growth of high-tech startups: assessing the impact of selective and automatic support schemes. Industrial and Corporate Change, 22(5), article 37.

Cumming, D. J., Grilli, L. & Murtina, S. (2017). Public and independent venture capital investments in Europe: analysis of companies ' performance. Journal of Corporate Finance, 42, 439-459. https://doi.org/10.1016/j.jcorpfin.2014.10.016

Danilina, E., Malikova, I. & Gorelov, D. (2020). Financing and support of employees of bankrupt companies in transport sector at municipal and state levels: national and international practice. Amazonia Investiga, 9(25), 135 -142. https://amazoniainvestiga.info/index.php/amazonia/article/view/1038

De la Hoz-Rosales B., Camacho Ballesta J. & Tamayo Torres I. (2019). Effects of innovative entrepreneurship and the information society on social progress: An international analysis. Entrepreneurship and Sustainability Issues, 7(2), 782-813. https://doi.org/10.9770/jesi.2019.7.2(1)

Dudin, M. N., Shakhov, O. F., Ivashchenko, N. P. & Shakhova, M. S. (2020). Development of entrepreneurial competencies in the economy (evidence from digital entrepreneurship). Revista Inclusiones, 7, 54-68.

Dudin, M. N., Shakhov, O. F., Vysotskaya, N. V. & Stepanova, D. I. (2020). Public and Private Partnership: Innovation-Driven Growth of Agriculture at the Regional Level. Journal of Environmental Management and Tourism, 10(7), 1435-1444.

Eurofound (2018), Nonstandard forms of employment: Recent trends and future prospects, Eurofound, Dublin.

Eurostat. (2020a) Domestic R&D expenditure (GERD) by activity sector. Retrieved from: https://stats.oecd.org/Index.aspx?DataSetCode=GERD_TORD

Eurostat. (2020b). Domestic expenditure on R&D (exploration), by sectors of performance. Retrieved from: https://stats.oecd.org/Index.aspx?DataSetCode=GERD_SEO

Eurostat. (2020c) R & d personnel by industry, occupation and gender. Retrieved from: https://stats.oecd.org/Index.aspx?DataSetCode=PERS_OCCUP

Galindo M.-A., Méndez-Picazo M.-T. (2013). Innovation, entrepreneurship and economic growth. Management Decision, 51(3), 501-514. https://doi.org/10.1108/00251741311309625

Giraudo, E., Giudici, G. & Grilli, L. (2019). Entrepreneurship policy and the financing of young innovative companies: Evidence from the Italian Startup Act. Research Policy, 48(9), 103801.

Giudicic, G., Gerini, M. & Rossi-Lamastra, S. (2018). Crowdfunding of entrepreneurial projects based on remuneration: the impact of local altruism and localized social capital on the success of initiators. Small business Economics, 50(2), 307-324.

Grilli, L., Mazzucato, M., Meoli, M. & Skellato, G. (2018). Sowing the seeds of the future: the policy of financing tomorrow's innovations. Technological forecasting and social change, 127, 1-7.

Grilli, L., Mrkadzic, B. & Latifi, G. (2018). Venture capital in Europe: social capital, formal institutions and mediation effects. Small business Economics, 51(2), 393-410.

Karshalova, A.D., Markhayeva, B., Aitkazina, M.A. & Mukushev, A. (2017). Improvement of management accounting in the context of uncertainty and risks in the food retailing sector in the Republic of Kazakhstan. Journal of Applied Economic Sciences, XII, Winter 8(54), 2275-2282.

Kirchhoff, B.A., Newbert, S.L., Hasan, I. & Armington, C. (2007). The influence of University R&D expenditures on new business formations and employment growth. Entrepreneurship: Theory and Practice, 31(4), 543-559.

Klyver, K., Hunter, E., Watne, T. (2012). Entrepreneurial ties and innovativeness in the start-up decision. International Journal of Entrepreneurship and Innovation, 13(3), 153-163. https://doi.org/10.5367/ijei.2012.0084

Krasnov, A., Beknazarov, B., Jarikbayeva, D., Yeshpanova, D. & Karshalova, A. (2019). Security of the Eurasian economic union member states: socioeconomic and financial aspects. Journal of Security and Sustainability Issues, 9(2), 637-648. https://doi.org/10.9770/jssi.2019.9.2(21)

Kumar, M. (2019). Global environmental policies with innovation spillovers. Management of Environmental Quality: An International Journal, 30(4), 833-850. https://www.emerald.com/insight/content/doi/10.1108/MEQ-05-2018-0098/full/html

Laužikas, M., Miliūtė, A. 2020. Liaisons between culture and innovation: comparative analysis of South Korean and Lithuanian IT companies. Insights into Regional Development, 2(2), 523-537. https://doi.org/10.9770/IRD.2020.2.2(2)

Lee, W.-L., Hsieh, C.-T. & Huang, J.-C. (2020). Innovative Entrepreneurship Education of Computer Discipline in Colleges and Universities. Lecture Notes in Electrical Engineering, 551, 699-704. https://doi.org/10.1007/978-981-15-3250-4_88

Li N., Samin, H. & Cowling, M. (2015). Access to Finance for innovative SMEs after the financial crisis. Research policy, 44(2), 370-380.

Lucchese, M. & Pianta, M. (2012). Innovation and employment in economic cycles. Comparative Economic Studies, 54(2), 341-359.

Mas-Tu, A. & Simón Moya, V. (2015). Young innovative companies (Yic) and entrepreneurship policy. Journal of Business Research, 68 (7), 1432-1435. https://doi.org/10.1016/j.jbusres.2015.01.028

Mohd, Rosli, M. & Syamsuriana, Sidek. (2013). The Impact of Innovation on the Performance of Small and Medium Manufacturing Enterprises: Evidence from Malaysia. Journal of Innovation Management in Small & Medium Enterprise, 1-16. https://doi.org/10.5171/2013.885666

Muraya, E. N., Roganov ,V. R., Skiteva, E. I., Evgrafova, I. V. & Daudov, I. L. (2019). Digital Entrepreneurship and Education: Support for Innovative Projects. International Journal of Advanced Trends in Computer Science and Engineering, 8(6), 3304-3311.

National Statistical Committee of the Republic of Belarus. Indicators of the European Innovation Scoreboard (EIS-2018) for the Republic of Belarus. Retrieved from: https://www.belstat.gov.by/ofitsialnaya-statistika/realny-sector-ekonomiki/nauka-i-innovatsii/

OECD, based on the 2019 OECD survey of national innovation statistics and the Eurostat's Community Innovation Survey (CIS-2016), Retrieved from: http://oe.cd/inno-stats, January 2020.

On the innovative activities of enterprises in the Republic of Kazakhstan. (2018). Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan. Retrieved from: https://stat.gov.kz/api/getFile/?docId=ESTAT307225

Orlova, N.A. (2017). Nonstandard forms of employment and changes in human capital: Analysis of the unskilled labor migration to Russia (2017) Monitoring Obshchestvennogo Mneniya: Ekonomicheskie i Sotsial'nye Peremeny, 1(137), 156-170.

Patent Index 2019. Retrieved from: https://www.epo.org/index.html https://www.epo.org/index.html

Ruchkina, G., Melnichuk, M., Frumina, S. & Mentel, G. (2017). Small and medium enterprises in the context of regional development and innovations. Journal of International Studies, 10(4), 259-271.

Saiz-Álvarez, J.M., Cuervo-Arango, C. & Coduras, A. (2013). Entrepreneurial strategy, innovation, and cognitive capabilities: What role for intuitive smes? Journal of Small Business Strategy, 23(2), 29-40.

Serrano, F., & Altuzarra, A. (2010). Firms innovation activity and numerical flexibility. Industrial and Labor Relations Review, 63(2), 327-339.

Suglobov, A. E., Repushevskaya, O. A., Tkach, A. V., Dashkov, L. P. & Balalova, E. I. (2020). E-Commerce development prospects in the enterpreneurship of the Russian Federation. Revista Inclusiones, 7, 342-349.

The Global Innovation Index (2019). Creating Healthy Lives—The Future of Medical Innovation. Cornell University, INSEAD, and the World Intellectual Property Organization, Retrieved from: https://www.globalinnovationindex.org/Download.aspx?file=/userfiles/file/reportpdf/gii-full-report-2019.pdf

Velilla, J. & Ortega, R. (2020). Providing new products by innovative entrepreneurs in Europe. Economics and Business Letters, 9(2), 90-96. https://doi.org/10.17811/ebl.9.2.2020.90-96

Wang, S., Wang, L., Xu, Q., & Zhu, Y. (2019). Rival Absorptive Capacity and Innovation Performance of an Enterprise: The Moderating Effect of Dual Appropriability Mechanisms. Transformations in Business & Economics, 18(3C (48C)), 565-579.

Bakyt BEKNAZAROV
ORCID ID: https://orcid.org/0000-0002-0518-2398

Roza NIYAZBEKOVA
ORCID ID: https://orcid.org/0000-0001-6666-0456

Ussen AMIRSEITOV
ORCID ID: https://orcid.org/0000-0002-6051-7496

Aiganym KOKENOV
ORCID ID: https://orcid.org/0000-0002-7933-9247

Marzhan DAURBAYEVA
ORCID ID: https://orcid.org/0000-0001-7345-6648

Madina AITKAZINA
ORCID ID: https://orcid.org/0000-0002-8410-0900

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:
@Entrepr69728810

_____

A NEW METHOD TO EMPOWER ORGANIZATIONAL READINESS FOR CHANGE IN INDONESIAN SMEs[*]

Airlangga Hartarto [1], Jenri MP Panjaitan [2], Sumiyana Sumiyana [3*]

[1]*Indonesian Coordinating Minister for Economy, Finance, and Industry, Indonesia*
[2]*Indonesian Ministry of Industrial Economics, Indonesia*
[3]*University of Gadjah Mada, Indonesia*

E-mails: [1]airlangga.hartarto@gmail.com; [2] jenripanjaitan@hotmail.com; [3*] sumiyana@ugm.ac.id *(Corresponding author)*

Abstract. As per newspapers and national news reports, small and medium-sized enterprises (SMEs) in Indonesia, currently 26,574 in number, are spreading widely. The transformation of SMEs to large, mature business entities is slow. This study investigates the sluggish transformation of SMEs in Indonesia and offers new explanations for the sluggishness, focusing on knowledge empowerment instead of financial aspects. A new development model was constructed with an aim to enhance SMEs. This study serves as research with a paradigm of constructivism, prioritizing knowledge empowerment. Executive officers of SMEs should aim for the construction of conceptual knowledge of social networks and social cognition in a sequential-ordered logic to achieve organizational readiness and readiness for change. They, moreover, internalize these concepts to transform SMEs into large, mature business entities with high levels of competitiveness, leadership engagement, dynamic capabilities, and profound sustainabilities.

Keywords: networking; social networks; social-cognitive; readiness for change; innovativeness; optimism; commitment; efficacy

1. Introduction

First, this study investigates the sluggish transformation of SMEs in Indonesia, caused by Indonesian regulators' concentration on financial capabilities for SMEs. However, researchers argue that the sluggishness is due to a lack of knowledge empowerment. This study develops a model to explain how SMEs can efficiently transform using conceptual knowledge of social networks, social cognitive, organizational readiness, and change. To support the research model that could be used to deter the sluggishness, this research posits social network (Fatoki, 2011; Jones & Volpe, 2011; Lee et al., 2010; Zhou et al., 2007; Galaso, & Kovářík, 2018; Belz et al., 2019), social cognitive (Bandura, 1986, 1988, 1989, 2008), organizational readiness (Chen et al., 2019; Coleman et al., 2019; Dabholkar, 1996; Islam et al., 2019; Puklavec et al., 2014), and readiness for change (Heckmann et al., 2016; Weiner et al., 2008, 2009; Kuzmin, & Barbakov, 2015). All theories are constructed by this study into a sequentially ordered research model and conclude in organizational readiness for change.

This research offers a fresh perspective in several ways. First, it can explain the construction of the transformation of SMEs to achieve organizational readiness and change. The capability of SMEs to form social networks (Chen et al., 2019; Fatoki, 2011; Jones & Volpe, 2011; Lee et al., 2010; Zhou et al., 2007) and their social cognition (Bandura, 1986, 1988, 1989, 2008; Boudreaux et al., 2019; Majid et al., 2017) supports the development of SMEs in terms of organizational readiness and change. SMEs could achieve growth opportunities by expanding their network and capture social cognitive phenomena. Researchers argue that these SMEs could be sustainable because of their social capital. The social capital of SMEs is rooted in supply chain networks, which can reduce inter-dependencies on an individual supplier. Moreover, SME's social capital has the shape of cumulative knowledge, which is used to counter environmental uncertainties and pressures. In other words, SMEs have self-efficacies that are equivalent to knowledge capital to solve future problems.

Second, this research focuses on the constructivism paradigm, which emphasizes knowledge empowerment for owners and executive officers of SMEs rather than the financial aspect. The enhancement of Indonesian SMEs did not merely need financial capital, but also inducements of social network and social cognitive knowledge that could save them in the future. This study argues that knowledge supremacy is a strategic transformation process to empower SMEs. In the negation statement, this research disagrees with the concept of SME enhancement, which is centered on financial capital. The researchers argue that the tactical method for SME transformation is to use knowledge empowerment as a supreme strategy. We also suggest that knowledge empowerment is closed to technocracy, agreeing with Mcdonnell & Valbruzzi (2014) and Obar (2016).

Third, this study develops a new model to achieve organizational readiness and change for SMEs to enable them for high growth opportunities, competitiveness, and dynamic capabilities, as suggested by extant research. This research model developed new constructs—social network and social cognitive—to prepare SMEs for organizational readiness and change. Previous studies employed the constructs of business, financial, and innovator characteristics (Chelliah et al., 2010; Durrah et al., 2016; K. Li et al., 2016; Majocchi et al., 2015; Noori et al., 2017; Tongli et al., 2019) to explain the readiness of SMEs. The researchers arranged all constructs in ordered-sequential associations with nomological validity, ascertaining ordered-sequential structures for the new model. These associations were recommended by Kraus & Tan (2015) and Hamid et al. (2015) in relational constructivism.

This study used the assumption that SME owners and executive officers primarily run their business by considering costs and benefits and thus have beliefs, attitudes, and behaviors with high self-control (Timpano & Schmidt, 2013; Willems et al., 2018). The second assumption is that this study ignores the events of state-directed agenda to empower SMEs in all aspects of the Indonesian local government. This research could not take into account regional government agendas due to 34 Indonesian provinces that had governors. Therefore, it is ceteris paribus that provincial programs for SME empowerment are excluded from the discussion.

This study makes contributions to regulators of Indonesia's government consciousness to empower and control SME growth and transformation. The consciousness should be grounded in prioritizing knowledge empowerment in addition to financial capitals, which can enhance the abilities and capabilities of SMEs to transform themselves (Mcdonnell & Valbruzzi, 2014; Obar, 2016). Regulators should enhance cumulative knowledge for SME owners and executive officers, especially in social networks and social cognition, as these constructs could improve organizational readiness and change for SMEs. On the other hand, the Indonesian government should place the highest priority on knowledge dissemination to increase the dynamic capabilities of SMEs in the future (Fatoki, 2011; Jones & Volpe, 2011; Lee et al., 2010). The Indonesian government must disseminate information on social networks and social cognition to SME owners and executive officers to improve their organizational capabilities and provide them with growth opportunities, competitiveness, and robustness from environmental uncertainties.

This study specifies the core skills and competencies that SME owners and officers should be made aware of the needs. Skills and competencies derived from social networks are networking abilities. The acquisition of networking abilities could transform SMEs to enterprising their organization, thus reducing the firm's risk (Fatoki, 2011; Lee et al., 2010). On the other hand, skills and competencies derived from social cognition are forethought, self-reactiveness, self-reflectiveness, and proactiveness (Bandura, 1986, 1988, 1989, 2008). Acquisition traits of competencies derived from social cognition could enable SME owners and officers to be flexible and dynamic when facing future environmental uncertainties. The traits derived from social networks and social cognition could enhance the transformation of SMEs with organizational readiness and change.

From the first and second contributions, this study refers to economic and political consequences Commerford et al., 2018; Koenig & Eagly, 2014) for which the Indonesian government must formulate policies to enhance organizational readiness and change (Heckmann et al., 2016; Lizar et al., 2015). The first policy should relate to the inter-sharing and communication of knowledge among SMEs in other industrial types and provinces to improve the social network of SMEs (Ali et al., 2019; Chen et al., 2019; Mehreen et al., 2019; Yamin & Kurt, 2018) and their social cognition (Arraya & Porfírio, 2017; Riley et al., 2016), especially in networking abilities around Indonesia. Moreover, this policy could create a potential demand for SME products and services with market shares across all areas of Indonesia. Meanwhile, inter-knowledge sharing and communication could educate and train SME owners and officers on how to internalize social cognition (H. Li et al., 2015; Pacillo, 2016) so that they may improve their foresight.

Section 2 presents the theoretical background, specifically, the motivation behind the intention of SMEs to conduct social networks, social cognitive, organizational readiness, and change. Section 3 presents research designs along with data collection and statistical tests for the reliability and validity of the models. Chapter 4 discusses the statistical results. This section also discusses the logic of statistical results and research findings and their inferences. Part 5 discloses conclusions, limitations, and designs for future research.

2. Theoretical Backgrounds and Hypotheses Development

Social Network Theory and Networking
Social network theory (SNT) explains an individual's or organization's need to construct relationships with those who have resources (Chen et al., 2019; Mehreen et al., 2019; Yamin & Kurt, 2018; Zhou et al., 2007). This connection usually has the motivation to maintain individuals' continuance to live in their environment. Meanwhile, business organizations make numerous connections to reduce dependencies on suppliers and improve future sustainabilities. This study infers that individuals or organizations consider the social network through networking to increase social capital (Leask & Parker, 2006; Liu et al., 2017). With the primary motivation of increasing knowledge, most SMEs conduct networking with knowledge dissemination internally and externally with others.

Organizations are generally keen to increase collaboration, which is used to create their innovation potentially (Leask & Parker, 2006) to gain benefits from connections with other firms. The most significant advantage is innovation (Ali et al., 2019; Chen et al., 2019; Fatoki, 2011; Yamin & Kurt, 2018). Researchers argue that SMEs could increase their relationships with others to make sustainable improvements (Rajala & Westerlund, 2010), alternative resource choices (Leask & Parker, 2006), and a repository of problem-solving techniques (Applegate et al., 2006; Bjelland & Wood, 2008). This study, therefore, infers that SME owners or executive officers have invisible colleges (Crane, 1972) as they conduct networking. The SMEs could thus help such firms solve business problems, run operating activities, and achieve their missions with others.

This study associates SMEs conducting social networks and organizational readiness because SMEs have active networking; they are organizations with abilities, capabilities, and the power to solve business problems, efficiently run operating activities and profoundly achieve missions and goals. These SMEs are highlighted as firms whose dynamic capability is high, business capacities are transformable, and competitiveness level is high. This research, therefore, concluded that SMEs have high organizational readiness and need for change, as they could be transformed (Applegate et al., 2006; Philip & McKeown, 2004; Yamin & Kurt, 2018). Moreover, these SMEs are firms where owners and executive officers have appropriate cumulative knowledge.

Social-Cognitive Theory
The social cognitive theory (SCT) states that individuals study and learn social phenomena to collect knowledge from societies. People tend to seek additional knowledge to justify their abilities and capabilities and use these to improve their lives and maintain sustainability. These individuals thus practice the SCT (Bandura, 1986, 2008; Boudreaux et al., 2019; Oo et al., 2018; Wang et al., 2019). This study likens human behavior with SCT from the perspective of organizations like SMEs that accumulate knowledge as they seek new business opportunities to conglomerate the firm's activities. Consequently, these SMEs maintain their operations and improve their operational, marketing, financial, and administrative powers.

The SCT argues that learning is crucial to acquire skills, methods, and strategies for a better life. Through learning, individuals and organizations identify and strengthen their beliefs (Bandura, 1988, 1989; Boudreaux et al., 2019; Wang et al., 2019). This study proposes that organizations may enhance their self-efficacy due to highly acquisitive pieces of knowledge. Furthermore, these organizations are expected to outdo other firms in terms of business. In other words, SMEs could improve their self-efficacy by learning how other firms conduct their business. In the identification perspective, SMEs learn social phenomena and use opportunities to develop new procedures, methods, and business.

This study proposes that the capabilities of SMEs employ social cognition to develop organizational readiness and enable change. Thus is supported by the argument that SMEs acquire motivation because they have new expectations for future business due to self-efficacy. This study agrees with Bandura (2008) that SMEs acquiring social cognition would have self-reflective, self-regulation, and vicarious capabilities. These SMEs, therefore, could adopt skills and knowledge that develop cognition and affection to change future directions. Researchers argue that the acquisition of social cognition is useful to SMEs as it supports the business transformation process. The conclusion affirms that such SMEs could transform with their capacities of organizational readiness and readiness for change significantly.

Business Characteristics

This study discusses business characteristics from three perspectives—firms, finances, and innovators. It associates these business characteristics with the performance of SMEs, which are measured with organizational readiness and capacity for change Tongli et al. (2019), Durrah et al. (2016), and Noori et al. (2017) suggested that business characteristics play a determinate role in SMEs' financial and non-financial performance. Researchers argue that the type of firm, financial situation, and innovator's knowledge are resources that could be used by SME management to generalize profits in their business. This study proposes that organizational readiness and capacity for change for SMEs are developed by these characteristics, as suggested by extant research concerning business performance.

The first type is the firm characteristic that measures SME profitability, firm-size, market share, social responsibility, and economic value (Chelliah et al., 2010; Noori et al., 2017; Wincent, 2005). The second type is the financial characteristic, including liquidity, solvability, financing method, turnovers of inventory, receivable, and cash, and default probability (Li et al., 2015; Li et al., 2016; Majocchi et al., 2015). The third type is innovator characteristic arising from future potential benefit, strength, opportunity, weakness, threats, skill, expertise, and environmental fit, which are imbibed in SME cognition of its owners and executive officers (Cant et al., 2014; Chittithaworn et al., 2011). Researchers took into account these three types of characteristics that extant studies have handled mainly as indicators of business performance (Durrah et al., 2016; Noori et al., 2017; Tongli et al., 2019).

This study argues critical reasoning of the association between business characteristics and their organizational readiness and adaptability for change. It believes that the bundling of the firm, financial, and innovator knowledge are a combination of tangible and intangible assets used to generate future cash inflows. These characteristics are also used to enable SME management to be more significant and ready for change (Coleman et al., 2019; Puklavec et al., 2014, 2018). SMEs thus benefit from the existence of these characteristics to capture future potential business by acting on their forward-looking capabilities. This study concludes that such SMEs are those that have the organizational readiness and readiness for change because they have anticipated future environmental pressures and uncertainties.

Organizational Readiness
A person's readiness is highlighted by the positive-additional motivation to lead missions, goals, and direction (Coleman et al., 2019; Liljander et al., 2006; Pruitt, 2015; Puklavec et al., 2018). An organization or person uses the motivation to achieve missions, goals, and directions as a resource to solve organizational problems and control all activities aligned with management requirements. Using motivation, researchers propose that SMEs can create behavioral optimism that supports individuals and organizations with dynamical skills and abilities (Liljander et al., 2006; Loyd & Gressard, 1984; Munger & Loyd, 1989; Scheier & Carver, 1987). Studies have also suggested that individuals or organizations that utilize their optimism are also highly creative (Puklavec et al., 2018). It has been found that SMEs with organizational optimism is highly sustainable and can achieve their organizational mission and goals due to this optimistic commitment (Coleman et al., 2019; Puklavec et al., 2018). On the other hand, an organization's creativity has consequences on its innovativeness (Chen et al., 2019; Coleman et al., 2019; Norman, 1999; Pratibha Dabholkar, 1996; Walker et al., 2016). This study thus concludes that SMEs with innovativeness have the organizational skills and readiness to transform into a higher business class.

SMEs that intend to expand their business should thus have the qualities of optimism as well as innovativeness (Chen et al., 2019; Coleman et al., 2019). With these qualities, SMEs are ready to be transformed using the intangible capital of knowledge. An SME's resources in intangible capitals are used by owners or executive officers to shift business at the industrial level or for conglomerate enlargement. Finally, this study evinces that knowledge is a tool for SMEs to prepare for higher organizational readiness and concludes that whether

organizational readiness is achieved or not depends on whether the management of these SMEs considered knowledge as primarily important.

Organizational Readiness for Change

Organizational readiness for change refers to the transformational capacity of an entity for enhanced levels of operation or scalability (Heckmann et al., 2016; Lizar et al., 2015). Researchers argue that SMEs may or may not be transformed. The organizationally cumulative knowledge, as well as owners' and executive officers' capacities, support the contingency of the transformation process. According to Heckmann et al. (2016), Lizar et al. (2015), Weiner (2009), Weiner et al. (2008), the transformation process for a business organization depends on the "change commitment" and "change efficacy." Therefore, we argue that SME owners and executive officers who have cumulative knowledge support the process of "change commitment" and "change efficacy" development. This study proposes that organizational readiness for change depends on whether the SMEs possessed "change commitment" and "change efficacy." In other words, "change commitment" and "change efficacy" function as intangible assets for the SME. This intangible asset, therefore, is used to transform the business of SMEs to become more significant dynamic capabilities.

3. Hypotheses Developments

Researchers argue that the networking abilities of SME owners could improve their organizational performance. Thus, as innovators, SME owners perpetually seek new relationships in supply chains and customers. SME owners and executive officers expand their connections to diminish dependencies on limited resources by practicing social network concepts with learning and communication. Due to an expansion in their connectivities, SMEs can prepare for organizational readiness and can easily transform into higher capacities. Therefore, the following hypotheses H1a and b were formulated.

H1a: Social networks positively influence organizational readiness for SMEs.
H1b: Social networks positively influence organizational readiness for change for SMEs.

Similar to the logical reasoning of hypotheses H1a and b, this research argues that SMEs' abilities to capture and internalize social cognition would make them precautious, self-reflective, self-reactive, and proactive. If owners or executive officers of SMEs internalize social cognition, they can achieve organizational transformation as desired. This study argues that SMEs have organizational readiness and can change as they spread their beliefs, products, or services to societies. Therefore, research hypotheses H2a and b were developed.

H2a: Social cognitions positively influence organizational readiness for SMEs.
H2b: Social cognitions positively influence organizational readiness for change for SMEs.

Firm characteristics refer to an organization's ability and performance with regard to gaining profits, increasing inventory turnover, servicing customers, and conducting social responsibilities, and are associated with managerial skill and competencies. This study argues that SMEs work like regular firms. Consequently, SMEs operate to achieve optimal performance, which varies among them. The variation of SME performance determines their organizational readiness and readiness for change. This study proposes that the firm characteristics of SMEs influence their readiness to be transformed to an advanced level. Therefore, hypotheses H3a and b were constructed.

H3a: Firm characteristics of SMEs positively influence their organizational readiness.
H3b: Firm characteristics of SMEs positively influence their organizational readiness for change.

Expanding on the development of hypotheses H3, this study argues that the financial characteristics of SMEs are akin to their firm characteristics. SMEs specify financial characteristics in their loan policy, probability of default,

credit policy, and the others. This study takes into account that the financial characteristics of SMEs determine their organizational readiness and readiness for change. It is argued that financial characteristics empower the dynamic capabilities and competitiveness of SMEs to expand their level of business. Therefore, hypotheses H4a and b were developed.

H4a: Financial characteristics of SMEs positively influence organizational readiness.
H4b: Financial characteristics of SMEs positively influence organizational readiness for change.

Innovators and entrepreneurs of SMEs lead businesses with the necessary knowledge to manage missions and goals, the expertise to identify and analyze the relevant and future potential business, and avoid environmental and business uncertainties. This study argues that entrepreneur characteristics profoundly develop organizational competencies of SMEs. These competencies enhance organizational readiness and readiness for change for SMEs. Thus innovators and entrepreneurs protect and guarantee business continuity. Therefore, hypotheses H5a and b were constructed.

H5a: Innovator characteristics of SMEs positively influence organizational readiness.
H5b: Innovator characteristics influence their organizational readiness for change positively.

Researchers argue that SMEs with organizational readiness have optimism and innovative ways to improve their businesses. If SME owners and executive officers embed their capabilities and competencies motivated by change, they can easily achieve organizational readiness for change. These motivations to change particularly stem from commitment and efficacy, and in turn, allow SMEs to transform. In other words, SMEs take into account organizational motivations and spirits, which are used to enhance their dynamic capabilities and competitiveness levels in facing future challenges. However, this study argues that SMEs with high organizational readiness are already changed. In other words, they do not require readiness for change organizationally because they are already in the changing process. Therefore, hypothesis H6 was formulated.

H6: Organizational readiness of SMEs negatively influences organizational readiness for change.

This research bundled all associations of these constructs into ordered-sequential logic reasoning in the Study Model, as seen in Figure 1 and Figure 2. These models explain and predict SME organizational readiness and readiness for change, influenced by their business characteristics and capabilities of SMEs in social networks and social cognition. Figure 1 presents the Research Model - 1. Model -1 is split into two models to precaution the collinearity between social concepts (social networks and cognition) and characteristics (firm, finance, and innovator). It, then, named the split model with Model -1 Split -1. It also presents another perspective, a second-order model, and then investigates robustness associations in Research Model – 2, to account for characteristics that changed into unidimensional ones. In other words, this study role all types of SMEs characteristics as a second-order model because of their business reflection.
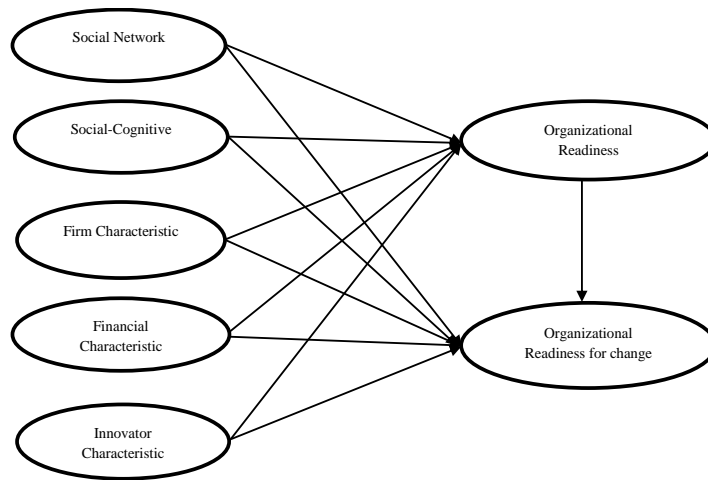
Figure 1: Research Model 1
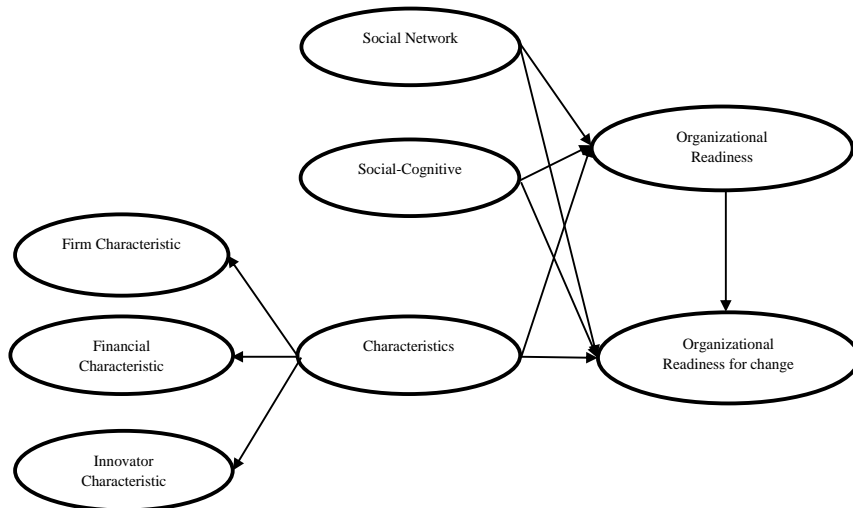
Figure 2: Research Model 2

4. Research Method

Sample and Measurement

Using physical survey methods, data were taken from SME firms across Indonesia from May to October 2019. This method is intended to improve the accuracy of data responses. We believe that this method is used to capture the real phenomena of SME firms in Indonesia. The data collection was based on a purposive sampling technique. Teddlie & yu (2007) suggested defining the criteria to select data samples that support the missions and goals of the research. Therefore, this study specifies certain criteria as below.

1. This study selected SMEs that gain either operating profits or total comprehensive profits.
2. It also selected SMEs that have account payables or long-term debts that are used for long-term investments. Researchers did not differentiate between sources of debts such as banks, the government, or rural credit.
3. The study chose SMEs with total assets equal to or above IDR 500 million. It considers those SMEs which had related to either commercial banks or credit institutions.

4. Finally, SMEs that are financial institutions—conventional and sharia—were excluded. Researchers argue that these SMEs did not entirely depend on production costs, which were material resources or labor costs.

First, this study adopted variable measurements of social networks and networking from Chen et al. (2019); Fatoki (2011); Horak et al. (2019); Jones & Volpe (2011); Lee et al. (2010); Mehreen et al. (2019); Wasserman & Galaskiewicz (1994); Yamin & Kurt (2018); and Zhou et al. (2007). This variable comprised questions regarding experience, involvement in the profession, relationship with the governmental institution, disclosure of financial reporting, customer relationship, and post-sale services. Second, this study took into account Bandura (1986, 1988, 1989, 2008). This study considered all variables in these extant research of social cognition. The indicator of SME owners' and officers' knowledge was used to justify their capabilities, competencies, and self-efficacy. Third, it posits Chelliah et al. (2010); Durrah et al. (2016); Moreno et al. (2010); Noori et al. (2017); Stanwick & Stanwick (1998); Tongli et al. (2019); and Wincent (2005). This study considered the measurements of the firm's financial profits, return on invested capital, market share, and business size. Fourth, this study refers to Beck & Demirguc-Kunt (2006), who use the financial characteristics of SMEs, including debt-to-equity ratio, interest rate, turnover, and probability to be bankrupt. Fifth, this research examines innovator or entrepreneur characteristics. This variable measures their potential benefits, strength, weaknesses, opportunities, threats, skills and expertise, methods for searching debts, and environmental fit. Sixth, the study considered organizational readiness of SMEs by using variables suggested by Coleman et al. (2019); Pruitt (2015); Puklavec et al. (2018); and Walker et al. (2016), specifically, endowment capitals of optimism and innovativeness. Comfort and security can help SMEs face environmental uncertainties and pressure. Seventh, this study builds on work by Armenakis et al. (1993, 1999); Cunningham et al. (2002); Heckmann et al. (2016); Helfrich et al. (2009); Holt, Armenakis, Feild, et al. (2007); Holt, Armenakis, Harris, et al. (2007); Lizar et al. (2015); Shea et al. (2014); and Weiner (2009) to develop the variable of organizational readiness for change with two leading indicators—the SME's internal beliefs for changing commitments, and efficacy for change. Finally, this study designed all variables with ordinal choices in questioners with answers ranging from Strongly Agree (SA), Agree (A), Neither Agree nor Disagree (N), Disagree (D), to Strongly Disagree (SD).

Statistical Tests

After data were collected, the variables were tested for reliability using Cronbach's alpha, and the model was tested for validity (Cooper & Schindler, 2014; Hair et al., 2014). Thus, this study investigates the regularity of data that was collected using proper measurement instruments. After the initial stage, convergent and discriminant validities were simultaneously examined, and it was found that each indicator instrument could differentiate within-construct and cross-construct. In other words, it could achieve convergent and discriminant validities that could be manipulated by deleting indicators that were not optimally reliable or valid. This study, therefore, infers that all variables are eligible to be used to accomplish the research objectives due to the absence of data bias. Regardless of whether the examination results of reliability and validity tests fulfill standard values, this research continues to investigate nomological validity (Kline, 2015; Teddlie & yu, 2007). The model's goodness-of-fit was examined using Chi-Square- X^2, CMIN/DF or Relative X^2, Comparative Fit Index (CFI), Tucker Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). This study took into account normative standards used to determine the goodness-of-fit level, as suggested by Hancock & Mueller (2013); Kaplan (2008); Kline (2015); and Teddlie & yu (2007).

5. Statistical Result and Discussion

Demography and Descriptive Statistics

This study was conducted on 711 respondents, of whom seven were eliminated due to incomplete data fulfillment. The final sample of 704 represented all regencies in the Indonesia area and was collected using a direct-physical survey by visiting each respondent. The authors explain that the selected provinces are randomly due to easiness

in transportation. Table 1 reports the data arrays. The authors acknowledged that Indonesia is spread over 34 provinces and comprises almost 64 big cities, of which 18 cities (regencies) common to SMEs were chosen. It was noted that Pontianak city supported this research data as 52 SMEs or 7.39%. Table 1 shows others at 204 (28.98%). The data on others' are from many cities that contribute no more than ten SMEs.

Table 1 Research Data and Demography

Categories	Explanations	Numbers	Percentage
Regions (Provinces)	Banjarnegara	45	6.39%
	Magelang	26	3.69%
	Karanganyar	11	1.56%
	Klaten	16	2.27%
	Kebumen	22	3.13%
	Kudus	43	6.11%
	Purworejo	19	2.70%
	Sukoharjo	38	5.40%
	Surakarta	23	3.27%
	Temanggung	21	2.98%
	Wonosobo	22	3.13%
	Madura – Bangkalan	48	6.82%
	West Kalimantan – Pontianak	52	7.39%
	North Sulawesi – Manado	19	2.70%
	North Sumatera – Medan	25	3.55%
	Yogyakarta – Bantul	13	1.85%
	Yogyakarta – Yogyakarta	31	4.40%
	Yogyakarta – Sleman	26	3.69%
	Others	204	28.98%
Ages of Business	1–3 years	98	13.92%
	4–6 years	137	19.46%
	7–9 years	78	11.08%
	More than ten years	300	42.61%
	Others	91	12.93%
Business Legal-Form	Co-Operation	12	1.70%
	Limited Company	49	6.96%
	Limited Partnership	105	14.91%
	Personal Firm	3	0.43%
	Others	535	75.99%
Positions of Respondent	Owners (Innovators)	518	73.58%
	Top Executive officers	112	15.91%
	Others	74	10.51%

This research took into account 300 SMEs (42.61%) than had existed for at least ten years, indicating that they had long struggled to sustain and maintain their businesses. This data was considered attractive because some SMEs did not shape their business as per Indonesian law. In all, 535 (75.99%) SMEs did not manage their business as per legal regulations. This study documented 518 (73.58%) SME owners who were interested in this research. SME owners profoundly respected all kinds of studies due to their appreciation of science and knowledge. From another perspective, the higher proportion of SME owners responding to questionnaires indicated that they still managed their business and were completely responsible for improving themselves.

Data collection was followed by data analysis. Table 2 reports the descriptive statistics for 704 respondents with all variables that had mean values not dominated by differences. The median values were approximately 4.00. Moreover, standard deviations of these variables were relatively similar, with 0.437 as the lowest value in the innovator characteristics and 0.593 as the highest in social networks. This study, therefore, inferred that mean, median, and standard deviations among those variables are likely identical, except for the variable of financial characteristics.

Table 2 Data Descriptives

Variables	Min.	Max.	Mean	Median	Std. Dev.
Social Networks	1.00	5.00	3.987	4.00	0.593
Social Cognitive	1.00	5.00	3.721	3.80	0.587
Firm Characteristics	1.00	5.00	3.639	3.67	0.583
Financial Characteristics	1.00	5.00	3.403	3.33	0.564
Innovator Characteristics	1.00	5.00	3.927	4.00	0.473
Organizational Readiness	1.00	5.00	3.784	3.86	0.522
Organizational Readiness for Change	1.00	5.00	3.942	4.00	0.517

Note: n: 704 respondents

Validity and Reliability Test Results

This study examined the collected data to measure its validity and reliability. The statistical analysis showed that KMO values for all variables exceeded 0.500 and were close to 1.000. Thus statistical results found that each variable has a distinct value, and each variable loaded each item question proposed by the research. The lowest KMO value, at 0.733, is the variable of social networks. However, this KMO value fulfilled that standard (Cooper & Schindler, 2014; Hair et al., 2014). Thus, this research data fulfilled the convergent and discriminant validities. This study also measures sampling adequacy with the column of MSA values. Table 3 indicates that MSA values for all variables resulted in more than 0.500. This research concluded that all variables had set their values without errors, which were influenced by others (Cooper & Schindler, 2014; Hair et al., 2014). Thus, this study met the convergent and discriminant validities.

Table 3 Results of Validity and Reliability Tests

Variables	Items	Corrected Item - Correlation	KMO	MSA	Factor Loading	Cronbach's Alpha
Social Networks (SN)	SN2	0.770		0.772	0.767	
	SN4	0.825	0.733	0.688	0.828	0.749
	SN5	0.813		0.716	0.817	
	SN7	0.589		0.826	0.584	
Social Cognitive (SC)	SC1	0.756		0.922	0.767	
	SC2	0.772		0.878	0.771	
	SC3	0.812		0.910	0.834	
	SC4	0.726		0.913	0.747	
	SC5	0.764	0.911	0.930	0.784	0.896
	SC6	0.690		0.926	0.667	
	SC8	0.461		0.920	0.390	
	SC9	0.793		0.924	0.805	
	SC10	0.705		0.877	0.707	
	SC11	0.771		0.914	0.765	
Organizational Readiness (OR)	OR1	0.755		0.889	0.762	
	OR2	0.766		0.861	0.771	
	OR3	0.728		0.882	0.730	
	OR4	0.777	0.858	0.891	0.778	0.874
	OR5	0.764		0.857	0.766	
	OR6	0.777		0.807	0.775	
	OR7	0.719		0.827	0.704	
Organizational Readiness for Change (ORC)	ORC2	0.671		0.942	0.659	0.926
	ORC6	0.700	0.920	0.951	0.694	
	ORC8	0.749		0.946	0.756	
	ORC9	0.750		0.941	0.755	

Variables	Items	Corrected Item - Correlation	KMO	MSA	Factor Loading	Cronbach's Alpha
	ORC10	0.779		0.904	0.780	
	ORC11	0.815		0.867	0.817	
	ORC12	0.803		0.926	0.805	
	ORC14	0.724		0.964	0.725	
	ORC15	0.763		0.886	0.765	
	ORC16	0.707		0.899	0.709	
	ORC20	0.700		0.917	0.693	
	ORC21	0.755		0.929	0.758	
Firm Characteristics (FCh.)	FCh.1	0.776		0.832	0.784	
	FCh.2	0.773		0.838	0.781	
	FCh.3	0.754	0.841	0.826	0.764	0.844
	FCh.4	0.784		0.813	0.792	
	FCh.5	0.658		0.881	0.635	
	FCh.6	0.754		0.882	0.742	
Innovator Characteristics (ICh.)	ICh.1	0.683		0.851	0.686	
	ICh.2	0.552		0.843	0.528	
	ICh.3	0.712		0.895	0.715	
	ICh.4	0.716	0.835	0.893	0.723	0.817
	ICh.5	0.746		0.764	0.757	
	ICh.6	0.763		0.773	0.774	
	ICh.7	0.651		0.902	0.636	
Financial Characteristics (FnCh.)	FnCh.1	0.680		0.851	0.681	
	FnCh.2	0.782		0.758	0.783	
	FnCh.3	0.783	0.800	0.780	0.790	0.816
	FnCh.4	0.735		0.783	0.748	
	FnCh.5	0.724		0.817	0.735	
	FnCh.6	0.628		0.872	0.592	

Note: Kaiser Mayer Olkin (KMO); Measure of Sampling Adequacy (MSA)

This data achieved standard reliability because all values of Cronbach Alpha were more than 0.600 (Cooper & Schindler, 2014; Hair et al., 2014). The lowest value of the reliability test was 0.749, which is the variable of social networks. It meant that the collected data were equivalent to what this study proposed to measure all variables. It also meant that this research got high data reliability. Further analysis was conducted after the fulfillment of validity and reliability.

Statistical Results

Table 4 shows statistical results for all causality tests of the hypotheses. All hypotheses were supported at a 1.00% significance level, except for hypotheses H3a and H3b in Research Model -1. Hypotheses H4a in Research Model -1 is not supported, but it is supported in the Research Model -1; Split -2. Hypothesis H1a proposed that social networks positively affect organizational readiness. Statistical results supported this hypothesis with the coefficient value of 0.713 and the CR-value of 10.068. Hypothesis H1b suggested that social networks positively affect organizational readiness for change. It is positively supported by the coefficient value of 1.509 and the CR-value of 9.158. Both hypotheses are statistically significant at the level of 1.00%. Hypothesis H2a is positively supported by the coefficient and the CR-value, which is 0.394 (12.413). Hypothesis H2b is also positively supported by the coefficient and the CR-value, which is 0.388 (5.994). This study concluded that social networks positively associated with either organizational readiness or efficacy for change.

Table 4 Statistical Results

Hypotheses		Causality	Model -1		Model -1; Split -1		Model -1; Split -2	
			Coeff.	CR	Coeff.	CR	Coeff.	CR
H1a	(+)	SN → OR	0.713	10.068***	0.766	10.602***		
H1b	(+)	SN → ORC	1.509	9.158***	1.597	9.278***		
H2a	(+)	SC → OR	0.394	12.413***	0.425	12.972***		
H2b	(+)	SC → ORC	0.388	5.994***	0.439	6.234***		
H3a	(+)	FCh. → OR	-0.023	-0.964			-0.206	-7.620
H3b	(+)	FCh. → ORC	-0.007	-0.227			-0.581	-4.903
H4a	(+)	FiCh. → OR	0.046	1.464			0.044	1.351***
H4b	(+)	FiCh. → ORC	0.018	0.443***			0.100	1.092***
H5a	(+)	ICh. → OR	0.189	4.629***			1.570	12.209***
H5b	(+)	ICh. → ORC	0.384	6.049***			4.840	6.112***
H6	(-)	OR → ORC	-0.742	-5.376***	-0.733	-5.237***	-2.256	-4.954***

Note: Social Networks (SN); Social Cognitive (SC); Firm Characteristics (FCh.); Financial Characteristics (FiCh.); Innovator Characteristics (ICh.); Organizational Readiness (OR); Organizational Readiness for Change (ORC). ***; **; *: statistically significant at levels of 1%, 5%, and 10%, respectively.

This study failed to support hypotheses H3a, H3b, and H4a. It inferred those firm characteristics did not influence either organizational readiness or change. It also failed to support the hypothesis H4a in Research Model -1 but succeeded that H4a in Research Model -1; Split -2. Thus, SMEs' financial characteristics somehow influence organizational readiness for change. It, therefore, inferred that financial characteristics affected the SMEs' readiness for change even if they were not needed. The remaining hypotheses are supported as expected and statistically significant at the level of 1.00%. This study highlighted hypothesis H6 that stated the negatively associated SME's organizational readiness and change with the coefficient value of -0.742, -0.713, and -2.256, respectively, and significant at the level of 1.00%. It raised an argument as to whether these SMEs had been effective in their organizational readiness; they did not intend to change their behavior due to creativity and innovativeness. In other words, these SMEs had done their learning to internalize both optimism and innovativeness when they want to enlarge their business (Chen et al., 2019; Coleman et al., 2019). Due to internalization, they had low motivation to adjust their readiness for change.

Table 5 Goodness-of-Fit Results

Criteria	Cut-off Standards	Model -1	Model -1; Split -1	Model -1; Split -2	Model -2
Chi-square	-	5443.257	3285.500	3032.866	3921.947
Probability	≥0.05	0.000	0.000	0.000	0.000
CMIN/DF	≤5.00	4.306	5.588	6.177	5.951
RMSEA	≤0.08	0.069	0.081	0.086	0.084
TLI	≥0.90	0.780	0.792	0.794	0.740
CFI	≥0.90	0.779	0.806	0.809	0.756
AIC	-	5671.257	3441.500	3172.866	4085.947

Statistical results for models' nomological validities are presented in Table 5. This study met all criteria that are almost close to a high goodness-of-fit. Statistical results showed that CMIN/DF for Research Model -1, which are split, are 4.306, 5.588, and 6.177, respectively, almost meeting the standard value. This table also showed for the transformed model in Research Model -2, which has a value of 5.951. It posits Revelle (2018) that the goodness-of-fit would be marvelous, meritorious, middling, mediocre, and miserable. The research models are in the meritorious level of goodness-of-fit. The values of RMSEA, CFI, and TLI were similar to standard values. Overall, the goodness-of-fit of all research model almost fulfilled the standard values at a meritorious level.

Therefore, it was concluded that this study achieved its nomological validity; statistical results were further interpreted.

Robustness Test Results: Re-Modelling on A Second-Order Factor
Failing to support hypotheses H3a and H3b, this study transformed Research Model -1 to Model -2. This transformation also intended to check the robustness results of the other hypotheses. When firm, financial, and innovator characteristics were employed as second-order factors, this study succeeded in supporting the association between characteristics and both organizational readiness and readiness for change. Statistical results showed that this association has coefficient values of 0.290 and 0.656, with the CR values of 6.486 and 5.334. Thus, characteristics, as a union of the SMEs' firm, finance, and innovator, affected organizational readiness and readiness for change. Some parts of SME characteristics somehow have collinearity with either social networks or social cognition. Nevertheless, variables of the firm, financial, or innovator characteristics have the possibility of collinearity with each other.

Table 6 Statistical Results of the Research Model -2

Hypotheses		Causality	Model -2	
			Coeff.	CR
H1a	(+)	SN → OR	0.200	6.585***
H1b	(+)	SN → ORC	0.577	7.056***
H2a	(+)	SC → OR	0.395	12.200***
H2b	(+)	SC → ORC	0.582	4.894***
H1,2,3(a)	(+)	Chr. → OR	0.290	6.486***
H1,2,3(b)	(+)	Chr. → ORC	0.656	5.334***
Refl.0		FCh. ← Chr.	1.000	
Refl.1		FiCh. ← Chr.	1.047	5.116***
Refl.2		ICh. ← Chr.	1.647	6.303***
H6	(-)	OR → ORC	-1.187	-4.302***

Note: Social Networks (SN); Social Cognitive (SC); Firm Characteristics (FCh.); Financial Characteristics (FiCh.); Innovator Characteristics (ICh.); Characteristics (Chr.); Organizational Readiness (OR); Organizational Readiness for Change (ORC). ***; **; *: statistically significant at the levels of 1%, 5%, and 10% consequtively.

The remaining associations are robust in the statistical results of the Research Model -2. This study also found that the association between organizational readiness and readiness for change for SMEs is consistent with previous findings in Research Model -1. Therefore, it was concluded that the SMEs' social networks and social cognition influenced either organizational readiness or readiness for change. The transformed model offered a more detailed explanation than the previous one. In other words, the model with the second-order factor could guide executive officers and owners of SMEs in enhancing and predicting organizational readiness and readiness for change.

6. Analysis and Discussion

First, this study found that most Indonesian SMEs were considerate of recommendations of social networks. Indonesian SMEs practiced networking and used it to enterprise their firm on both sides of the supply chain and customer relationship. By enterprising relationships, SMEs expanded their connectivity to reduce business risks as they could undoubtedly finance production or render services to customers. By these means, SMEs developed their organizational readiness. From another perspective, this study concluded that Indonesian SMEs conducted learning to support their enterprising processes. They enhanced intangible assets by capitalizing on their networking (Leask & Parker, 2006; Liu et al., 2017). Thus, this study evinced that most Indonesian SMEs remained sustainable through social networks and by networking (Chen et al., 2019; Mehreen et al., 2019; Yamin

& Kurt, 2018; Zhou et al., 2007). Thus, most Indonesian SMEs intensively pursued organizational readiness. Indonesian large enterprises, otherwise, have high organizational readiness and readiness for change due to their capital intensive and multinational corporation. However, all these SMEs contributed to Indonesia's GDP, which is approximately 57.8%.

Considering social networks and networking, most Indonesian SMEs are already at a state of organizational readiness as they possessed commitment and efficacy from their experiences facing competition and had achieved sustainability. Indonesian SMEs had thus actualized business with intangible capitals in the form of self-organizational commitment and self-organizational efficacy (Heckmann et al., 2016; Lizar et al., 2015). Therefore, Indonesian SMEs were committed to enhancing learning, networking, and enterprising in maintaining their ongoing concerns. By improving their learning and networking, Indonesian SMEs acquired efficacies that helped them withstand economic and environmental pressures. Because of withstanding pressures, most Indonesian SMEs possessed organizational readiness for change. Thus, they had intangible resources in the form of knowledge capital, which could be used as a strategic endowment to transform themselves into a higher business class.

In terms of social cognition, most Indonesian SMEs learned through social phenomena and improved knowledge through the learning process of capturing business opportunities. This study found the following shreds of logical evidence that most Indonesian SMEs conducted the act of learning (Bandura, 1988, 1989; Boudreaux et al., 2019; Wang et al., 2019). Most Indonesian SMEs produce their products and services in regional areas and sell them across Indonesia, capturing future potential business by considering areas. They also include the magnitude of demanded products or services, which are not over-production as well as shortage-productions, indicating that they measured their capacities in fulfilling customer demands. They controlled what was needed in terms of production inputs and utilized these inputs efficiently. This study concluded that most Indonesian SMEs managed their business organizationally due to the inducement of social phenomena (Bandura, 1988, 1989; Boudreaux et al., 2019; Wang et al., 2019). If they did not take into account the existing social phenomena, they failed to maintain their sustainabilities and ongoing concerns.

As a consequence of inducing social phenomena, most Indonesian SMEs constructed their organizational readiness and then readiness for change (Chen et al., 2019; Coleman et al., 2019; Norman, 1999; Pratibha Dabholkar, 1996; Walker et al., 2016). This study concluded that most Indonesia SMEs had developed and enhanced their capabilities, especially in self-regulation, self-reflectiveness, and vicariousness (Bandura, 2008). Thus, most Indonesian SMEs had taken into account the fact that social phenomena and problems had been induced by them organizationally. Continuously, Indonesian SMEs reflected their social learning to regulate themselves organizationally. They learned social phenomena to brainstorm new ideas, develop a new product, internalize knowledge, and achieve their mission and agendas. On the other hand, Indonesian SMEs largely practice what they have learned among other SMEs. This study, therefore, concluded that most Indonesian SMEs placed knowledge and learning as managerial preferences along with debts and capitals.

In another perspective of SME characteristics, this study highlighted that these characteristics somehow determined their organizational readiness and readiness for change. The characteristics of SMEs were defined using three dimensions of firm, finance, and innovator, which were combined into a unidimensional. The characteristics of SMEs did not precisely influence their readiness organizationally. This study argued that the business characteristics of SMEs were reflected in their social networks and social cognition (Coleman et al., 2019; Puklavec et al., 2014). It was highlighted that most forward-looking Indonesian SMEs possessed organizational readiness and that capturing both social networks and cognition is the spirit that motivates SMEs to reduce business risks. In other words, those SMEs acquired knowledge with their learning and enterprising that is useful to maintain sustainability (Durrah et al., 2016; Noori et al., 2017; Tongli et al., 2019). This study found that most Indonesian SMEs are not always motivated to reduce their business risks (C. Cant et al., 2014; Chittithaworn

et al., 2011) because they want to avoid environmental uncertainty and competitive pressures. This study took into account what SMEs lookout for as foresight.

Regardless of the different business characteristics and knowledge acquisition of Indonesian SMEs, it is inferred that most SMEs like to improve their social networks and cognitions. Thus, they searched and internalized social phenomena and problems chiefly (Coleman et al., 2019; Puklavec et al., 2018) without neglecting their needs of debts and capitals. In other words, this study inferred that most Indonesian SMEs primarily focused on innovativeness due to adaptability enhancements. With considering adaptative capabilities, most Indonesian SMEs could manage to maintain or slightly expand the business. This research, finally, inferred that most Indonesian SMEs had been developing and dynamically seizing then organizations dynamically. Most Indonesian SMEs had conducted organizational learning in their either managers, owners, or innovators.

7. Research Finding

This study found that the empowerment of Indonesian SMEs should be primarily focused on knowledge acquisitions without neglecting the needs of debts and equity capital for these SMEs. In this case, knowledge is related to all traits of social networks and social cognition. This study implied that knowledge acquisition would be useful for Indonesia SMEs to enhance their organizational readiness and readiness for change (Chen et al., 2019; Coleman et al., 2019). From another perspective, social networks and cognition recommend that learning is the supremacy for either individual or organizational capabilities. The capabilities of SMEs, which are improved by learning, are innovativeness stemming from social networks and searching opportunities as pieces of advice of social cognition.

The position of knowledge acquisition in the highest priority and has implications for regulators to facilitate most Indonesian SMEs when they want to accentuate business. These types of knowledge can guide SMEs to achieve their readiness and help them change organizationally. This study was restricted to two grand knowledge, which are a social network and social cognitive theories. Meanwhile, it invited knowledge that could enhance and broaden SMEs' organization in enlarging or conglomerating their business. This study concluded that Indonesian regulators must facilitate SMEs in relating to all dimensional traits of social networks and social cognition.

The Indonesian regulator, based on a social network, should provide the learning curriculum for all SMEs. In the curriculum, Indonesian SMEs could learn from each other (Mehreen et al., 2019; Yamin & Kurt, 2018; Zhou et al., 2007) when another SME had achieved its engineering, emergence, and transformation. The Indonesian regulator would better facilitate and serve these learning mechanisms. First, the Indonesian regulator should provide tools, media, and procedures for all SMEs to perform knowledge dissemination, communication, innovation, training, and management activity nationally. Second, with the first facilitation, the Indonesian regulator could capture SMEs' organizational cognition and social relationship and facilitate all SMEs, which are explained as an epistemic community or invisible college.

Meanwhile, based on SCT, the Indonesian regulator had to prepare a learning curriculum for all SMEs. First, the curriculum should facilitate all SMEs to improve their behaviors and make necessary adjustments. Each SME could learn how others had conducted business and achieved their goals. Most Indonesian SMEs, therefore, could gain insights into how they had to build and broaden their business organizationally (Bandura, 1988, 1989; Boudreaux et al., 2019; Wang et al., 2019). Second, the curriculum should allow all Indonesian SMEs to develop as an agency with self-regulating, self-reflective, self-proactive, and vicarious abilities. Thus, each SME could improve their organizational cognition, which is useful to resolve business problems.

If Indonesian regulators made an epistemic community that was accompanied by a learning curriculum, they could increase local and national capabilities simultaneously. In other words, most Indonesian SMEs already

possessed organizational readiness (Chen et al., 2019; Coleman et al., 2019; Norman, 1999; Pratibha Dabholkar, 1996; Walker et al., 2016) and readiness for change (Heckmann et al., 2016; Lizar et al., 2015). However, most Indonesia SMEs had some endowment knowledge, which helped improve the management of their business with high commitment and efficiency. It implied to the Indonesian government that economic transformation for SMEs is strategically defined as empowerment with knowledge supremacy. Therefore, an Indonesian regulator could play a strategic role in determining how SMEs solve problems, run their organizations, and accomplish their missions and goals successfully.

8. Conclusions, Limitations, and Future Research

This research investigated the sluggish transformation of SMEs in Indonesia. It succeeded in identifying and finding the cause of this sluggishness. It was argued that the transformation of SMEs needs empowerment of knowledge acquisition for executive officers and innovators. Most institutions in Indonesia focus on the financial perspective, which is not recommended. This research constructed a new model for SME transformation, which highlights the supremacy of knowledge empowerment. The authors put forward social networks, social cognition, and SMEs' readiness as well as readiness for change. These concepts are employed to highlight that most Indonesian SMEs need intangible capital, especially for organizational cognition.

This study evinced nomological validities in the Research Model -1. This model concluded that social networks, social cognition, firm, financial, and innovator characteristics could explain SMEs' readiness and readiness for change. This study found that the Research Model -1 is low goodness-of-fit. It, therefore, transformed into a new model—Research Model -2. The Model -2 constructed firm, finance, and innovator as second-order factors of unidimensional characteristics. This latest model showed that social networks, social cognition, and characteristics determined SMEs' readiness as well as readiness for change. This study concluded that the second model resulted in robustness. Therefore, it was concluded that the constructivism of SME organizational readiness had its validity.

From both sides of the research design and statistical conclusions, this study implied the needs of a new conceptual regulation from Indonesian regulators. The new theoretical regulation is a policy that could empower social networks and social cognition for all SMEs in Indonesia. This regulation did not only enhance social-intangible capitals but also developed SME readiness and readiness for change. In short, this new conceptual regulation controlled the empowerment of knowledge supremacy for all Indonesian SMEs, which could transform into large, mature business entities. Thus, the empowerment of SMEs thorough knowledge supremacy is a national-strategic role that could provide these Indonesian SMEs to run their business with high competitiveness levels and support the mission and goals of Indonesia's economic development.

The authors acknowledge that this study had high external and low internal validities. This research opens opportunities for further investigations. The first potential research is the use of experimental designs when executive officers and owners of SMEs are treated with problematic or beneficial cases accompanying either social networks or cognition. Another aspect that future potential research could explore is experimental designs for executive officers and owners of SMEs who in shock or facing a chaotic event. This treatment is used to measure differential behaviors due to a shock directed at reducing or increasing readiness levels. New research could be developed with qualitative research, focusing on what aspects of the SME's organizational cognition drive their commitment to change into a big, mature business. In other words, this new research investigated organizational cognition for executive officers and innovators at SMEs who have a strong motivation to transform their business or not.

References

Ali, Z., Gongbing, B., & Mehreen, A. (2019). Supply chain network and information sharing effects of SMEs' credit quality on firm performance. *Journal of Enterprise Information Management*, *32*(5), 714–734. https://doi.org/10.1108/JEIM-07-2018-0169

Applegate, L. M., Austin, R. D., & McFarlan, F. W. (2006). *Corporate information strategy and management*. McGraw-Hill/Irwin Custom Publishing.

Armenakis, A. A., Harris, S. G., & Feild, H. S. (1999). Making change permanent A model for institutionalizing change interventions. *Research in Organizational Change and Development*. https://doi.org/10.1016/S0897-3016(99)12005-6

Armenakis, A. A., Harris, S. G., & Mossholder, K. W. (1993). Creating Readiness for Organizational Change. *Human Relations*. https://doi.org/10.1177/001872679304600601

Arraya, M. A. M., & Porfírio, J. A. (2017). Training delivery methods as source of dynamic capabilities: the case of sports organizations. *European Journal of Training and Development*. https://doi.org/10.1108/EJTD-02-2016-0012

Bandura, A. (1986). The Explanatory and Predictive Scope of Self-Efficacy Theory. *Journal of Social and Clinical Psychology*. https://doi.org/10.1521/jscp.1986.4.3.359

Bandura, A. (1988). Organizational Applications of Social Cognitive Theory. *Australian Journal of Management*. https://doi.org/10.1177/031289628801300210

Bandura, A. (1989). Human Agency in Social Cognitive Theory. *American Psychologist*. https://doi.org/10.1037/0003-066X.44.9.1175

Bandura, A. (2008). Reconstrual of "Free Will" From the Agentic Perspective of Social Cognitive Theory. In *Are We Free?: Psychology and Free Will*. https://doi.org/10.1093/acprof:oso/9780195189636.003.0006

Beck, T., & Demirguc-Kunt, A. (2006). Small and medium-sized enterprises: Access to finance as a growth constraint. *Journal of Banking and Finance*. https://doi.org/10.1016/j.jbankfin.2006.05.009

Belz, G., Wawrzynek, L., Wasowicz, M. (2019). Network Potential of Innovation in Digital Transformation Projects. *Transformations in Business & Economics*, 18(2B (47B), 694-708.

Bjelland, O. M., & Wood, R. C. (2008). An inside view of IBM's "Innovation Jam." *MIT Sloan Management Review*.

Boudreaux, C. J., Nikolaev, B. N., & Klein, P. (2019). Socio-cognitive traits and entrepreneurship: The moderating role of economic institutions. *Journal of Business Venturing*. https://doi.org/10.1016/j.jbusvent.2018.08.003

C. Cant, M., Erdis, C., & M. Sephapo, C. (2014). Business Survival: The Constraints Experienced by South African SMEs in the Financial Sector. *International Journal of Academic Research in Business and Social Sciences*. https://doi.org/10.6007/ijarbss/v4-i10/1255

Chelliah, S., Sulaiman, M., Sivamurugan, P., & Munusamy, J. (2010). The moderating effect of firm size: Internationalization of small and medium enterprises (SMEs) in the manufacturing sector. *African Journal of Business Management*.

Chen, Y.-S., Lei, H.-S., & Hsu, W.-C. (2019). A Study on the sustainable development strategy of firms: Niche and social network theory. *Sustainability*, *11*(9), 2593.

Chittithaworn, C., Islam, A., Keawchana, T., & Yusuf, D. H. M. (2011). Factors affecting business success of small & medium enterprises (SMEs) in Thailand. *Asian Social Science*. https://doi.org/10.5539/ass.v7n5p180

Coleman, P. T., Kugler, K. G., Vallacher, R., & Kim, R. (2019). Hoping for the best, preparing for the worst : Regulatory focus optimality in high and low-intensity conflict. *International Journal of Conflict Management*. https://doi.org/10.1108/IJCMA-03-2018-0040

Commerford, B. P., Hatfield, R. C., & Houston, R. W. (2018). The effect of real earnings management on auditor scrutiny of management's

other financial reporting decisions. *Accounting Review*. https://doi.org/10.2308/accr-52032

Cooper, D. R., & Schindler, P. S. (2014). *Business Research Methods.© The McGraw− Hill Companies*.

Crane, D. (1972). *Invisible colleges; diffusion of knowledge in scientific communities*.

Cunningham, C. E., Woodward, C. A., Shannon, H. S., MacIntosh, J., Lendrum, B., Rosenbloom, D., & Brown, J. (2002). Readiness for organizational change: A longitudinal study of workplace, psychological, and behavioral correlates. *Journal of Occupational and Organizational Psychology*. https://doi.org/10.1348/096317902321119637

Dabholkar, P. A. (1996). Consumer evaluations of new technology-based self-service options: An investigation of alternative models of service quality. *International Journal of Research in Marketing*. https://doi.org/10.1016/0167-8116(95)00027-5

Durrah, O., Rahman, A. A. A., Jamil, S. A., & Ghafeer, N. A. (2016). Exploring the relationship between liquidity ratios and indicators of financial performance: An analytical study on food industrial companies listed in Amman Bursa. *International Journal of Economics and Financial Issues*.

Fatoki, O. O. (2011). The Impact of Human, Social, and Financial Capital on the Performance of Small and Medium-Sized Enterprises (SMEs) in South Africa. *Journal of Social Sciences*. https://doi.org/10.1080/09718923.2011.11892970

Galaso, P., & Kovářík, J. (2018). Collaboration Networks and Innovation: How to Define Network Boundaries. *Journal of Eurasian Economic Dialogue*, 3(2), 1–17.

Hair, J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. In *European Business Review*. https://doi.org/10.1108/EBR-10-2013-0128

Hamid, S., Waycott, J., Kurnia, S., & Chang, S. (2015). Understanding students' perceptions of the benefits of online social networking use for teaching and learning. *Internet and Higher Education*. https://doi.org/10.1016/j.iheduc.2015.02.004

Hancock, G. R., & Mueller, R. O. (2013). *Structural equation modeling: A second course*. Iap.

Heckmann, N., Steger, T., & Dowling, M. (2016). Organizational capacity for change, change experience, and change project performance. *Journal of Business Research*. https://doi.org/10.1016/j.jbusres.2015.07.012

Helfrich, C. D., Li, Y. F., Sharp, N. D., & Sales, A. E. (2009). Organizational readiness to change assessment (ORCA): Development of an instrument based on the promoting action on research in health services (PARIHS) framework. *Implementation Science*. https://doi.org/10.1186/1748-5908-4-38

Holt, D. T., Armenakis, A. A., Feild, H. S., & Harris, S. G. (2007). Readiness for organizational change: The systematic development of a scale. *Journal of Applied Behavioral Science*. https://doi.org/10.1177/0021886306295295

Holt, D. T., Armenakis, A. A., Harris, S. G., & Feild, H. S. (2007). Toward a Comprehensive Definition of Readiness for Change: A Review of Research and Instrumentation. In *Research in Organizational Change and Development*. https://doi.org/10.1016/S0897-3016(06)16009-7

Horak, S., Taube, M., Yang, I., & Restel, K. (2019). Two not of a kind: Social network theory and informal social networks in East Asia. *Asia Pacific Journal of Management*. https://doi.org/10.1007/s10490-018-9602-z

Jones, C., & Volpe, E. H. (2011). Organizational identification: Extending our understanding of social identities through social networks. *Journal of Organizational Behavior*. https://doi.org/10.1002/job.694

Kaplan, D. (2008). *Structural equation modeling: Foundations and extensions* (Vol. 10). Sage Publications.

Kline, R. B. (2015). *Principles and practice of structural equation modeling*. Guilford publications.

Koenig, A. M., & Eagly, A. H. (2014). Evidence for the social role theory of stereotype content: Observations of groups' roles shape stereotypes. *Journal of Personality and Social Psychology*. https://doi.org/10.1037/a0037215

Kraus, M. W., & Tan, J. J. X. (2015). Americans overestimate social class mobility. *Journal of Experimental Social Psychology*. https://doi.org/10.1016/j.jesp.2015.01.005

Kuzmin, E. A., & Barbakov, O. M. (2015). Institutional efficiency and processes of institutional changes (As seen by the Russian academic tradition). *Asian Social Science*, 11(6), 163–170. https://doi.org/10.5539/ass.v11n6p163

Leask, G., & Parker, D. (2006). Strategic group theory: Review, examination, and application in the UK pharmaceutical industry. In *Journal of Management Development*. https://doi.org/10.1108/02621710610655846

Lee, S. H., Kim, P. J., Ahn, Y. Y. & Jeong, H. (2010). Googling social interactions: Web search engine based social network construction. *PLoS ONE*. https://doi.org/10.1371/journal.pone.0011233

Li, H., de Zubielqui, G. C., & O'Connor, A. (2015). Entrepreneurial networking capacity of cluster firms: a social network perspective on how shared resources enhance firm performance. *Small Business Economics*. https://doi.org/10.1007/s11187-015-9659-8

Li, K., Niskanen, J., Kolehmainen, M., & Niskanen, M. (2016). Financial innovation: Credit default hybrid model for SME lending. *Expert Systems with Applications*. https://doi.org/10.1016/j.eswa.2016.05.029

Liljander, V., Gillberg, F., Gummerus, J., & van Riel, A. (2006). Technology readiness and the evaluation and adoption of self-service technologies. *Journal of Retailing and Consumer Services*. https://doi.org/10.1016/j.jretconser.2005.08.004

Liu, W., Sidhu, A., Beacom, A. M., & Valente, T. W. (2017). Social Network Theory. In *The International Encyclopedia of Media Effects*. https://doi.org/10.1002/9781118783764.wbieme0092

Lizar, A. A., Mangundjaya, W. L. ., & Rachmawan, A. (2015). The Role of Psychological Capital and Psychological Empowerment on Individual Readiness for Change. *The Journal of Developing Areas*. https://doi.org/10.1353/jda.2015.0063

Loyd, B. H., & Gressard, C. (1984). Reliability and Factorial Validity of Computer Attitude Scales. *Educational and Psychological Measurement*. https://doi.org/10.1177/0013164484442033

Majid, A., Yasir, M., & Yasir, M. (2017). Individual and work dynamics affecting the determinants of functional flexibility in SMEs: Evidence from Pakistan. *Journal of Entrepreneurship in Emerging Economies*. https://doi.org/10.1108/JEEE-03-2016-0008

Majocchi, A., Dalla Valle, L., & D'Angelo, A. (2015). Internationalization, cultural distance, and country characteristics: a Bayesian analysis of SMEs' financial performance. *Journal of Business Economics and Management*. https://doi.org/10.3846/16111699.2012.720600

Mcdonnell, D., & Valbruzzi, M. (2014). Defining and classifying technocrat-led and technocratic governments. *European Journal of Political Research*. https://doi.org/10.1111/1475-6765.12054

Mehreen, A., Hui, Y., & Ali, Z. (2019). A social network theory perspective on how social ties influence perceived employability and job insecurity: evidence from school teachers. *Social Network Analysis and Mining*. https://doi.org/10.1007/s13278-019-0572-z

Moreno, J. de J., Castillo, L. L., & Masere, E. de Z. (2010). Firm Size And Entrepreneurial Characteristics: Evidence From The Sme Sector In Argentina. *Journal of Business Economics and Management*. https://doi.org/10.3846/jbem.2010.13

Munger, G. F., & Loyd, B. H. (1989). Gender and Attitudes toward Computers and Calculators: Their Relationship to Math Performance. *Journal of Educational Computing Research*. https://doi.org/10.2190/r1hl-lg9j-1yn5-aq4n

Noori, J., Bagheri Nasrabadi, M., Yazdi, N., & Babakhan, A. R. (2017). Innovative performance of Iranian knowledge-based firms: Large firms or SMEs? *Technological Forecasting and Social Change*. https://doi.org/10.1016/j.techfore.2016.04.025

Norman, D. A. (1999). *The invisible computer: why good products can fail, the personal computer is so complex, and information appliances are the solution*. MIT press.

Obar, J. A. (2016). Closing the technocratic divide? Activist intermediaries, digital form letters, and public involvement in FCC policy making. *International Journal of Communication*.

Oo, P. P., Sahaym, A., Juasrikul, S., & Lee, S. Y. (2018). The interplay of entrepreneurship education and national cultures in entrepreneurial activity: a social cognitive perspective. *Journal of International Entrepreneurship*. https://doi.org/10.1007/s10843-018-0229-4

Pacillo, G. (2016). *Market participation, innovation adoption, and poverty in rural Ghana*. University of Sussex.

Philip, G., & McKeown, I. (2004). Business transformation and organizational culture: The role of competency, IS, and TQM. *European Management Journal*. https://doi.org/10.1016/j.emj.2004.09.026

Pratibha Dabholkar. (1996). Consumer evaluations of new technology-based self-service options: An investigation of alternative models of service quality. *International Journal of Research in Marketing*.

Pruitt, D. G. (2015). The evolution of readiness theory. In *Handbook of International Negotiation: Interpersonal, Intercultural, and Diplomatic Perspectives*. https://doi.org/10.1007/978-3-319-10687-8_10

Puklavec, B., Oliveira, T., & Popovič, A. (2014). Unpacking Business Intelligence Systems Adoption Determinants: An Exploratory Study of Small and Medium Enterprises. *Economic and Business Review*.

Puklavec, B., Oliveira, T., & Popovič, A. (2018). Understanding the determinants of business intelligence system adoption stages an empirical study of SMEs. *Industrial Management and Data Systems*. https://doi.org/10.1108/IMDS-05-2017-0170

Rajala, R., & Westerlund, M. (2010). Antecedents to consumers' acceptance of mobile advertisements - A hierarchical construct PLS structural equation model. *Proceedings of the Annual Hawaii International Conference on System Sciences*. https://doi.org/10.1109/HICSS.2010.64

Revelle, W. (2018). How to: Use the psych package for factor analysis and data reduction. *Rdrr.Io*.

Riley, J. M., Klein, R., Miller, J., & Sridharan, V. (2016). How internal integration, information sharing, and training affect supply chain risk management capabilities. *International Journal of Physical Distribution and Logistics Management*. https://doi.org/10.1108/IJPDLM-10-2015-0246

Scheier, M. E., & Carver, C. S. (1987). Dispositional Optimism and Physical Well-Being: The Influence of Generalized Outcome Expectancies on Health. *Journal of Personality*. https://doi.org/10.1111/j.1467-6494.1987.tb00434.x

Shea, C. M., Jacobs, S. R., Esserman, D. A., Bruce, K., & Weiner, B. J. (2014). Organizational readiness for implementing change: A psychometric assessment of a new measure. *Implementation Science*. https://doi.org/10.1186/1748-5908-9-7

Stanwick, P. A., & Stanwick, S. D. (1998). The relationship between corporate social performance and organizational size, financial performance, and environmental performance: An empirical examination. *Journal of Business Ethics*. https://doi.org/10.1023/A:1005784421547

Teddlie, C., & yu, F. (2007). Mixed Methods Sampling: A Typology With Examples. *Journal of Mixed Methods Research*. https://doi.org/10.1177/2345678906292430

Timpano, K. R., & Schmidt, N. B. (2013). The relationship between self-control deficits and hoarding: A multimethod investigation across three samples. *Journal of Abnormal Psychology*. https://doi.org/10.1037/a0029760

Tongli, B., Tono, H., & Tanasal, S. (2019). Financial Performance Analysis in Manufacturing Companies of The Cement Sectors Listing On Indonesia Stock Exchange (IDX) Period 2013-2017. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3306516

Walker, J. H., Saffu, K., & Mazurek, M. (2016). An Empirical Study of Factors Influencing E-Commerce Adoption/Non-Adoption in Slovakian SMEs. *Journal of Internet Commerce*. https://doi.org/10.1080/15332861.2016.1191049

Wang, S., Hung, K., & Huang, W. J. (2019). Motivations for entrepreneurship in the tourism and hospitality sector: A social cognitive theory perspective. *International Journal of Hospitality Management*. https://doi.org/10.1016/j.ijhm.2018.11.018

Wasserman, S., & Galaskiewicz, J. (1994). *Advances in social network analysis: Research in the social and behavioral sciences*. Sage.

Weiner, B. J. (2009). A theory of organizational readiness for change. *Implementation Science*. https://doi.org/10.1186/1748-5908-4-67

Weiner, B. J., Amick, H., & Lee, S. Y. D. (2008). Review: Conceptualization and measurement of organizational readiness for change. A review of the literature in health services research and other fields. In *Medical Care Research and Review*. https://doi.org/10.1177/1077558708317802

Weiner, B. J., Lewis, M. A., & Linnan, L. A. (2009). Using organization theory to understand the determinants of effective implementation

of worksite health promotion programs. In *Health Education Research*. https://doi.org/10.1093/her/cyn019

Willems, Y. E., Dolan, C. V., van Beijsterveldt, C. E. M., de Zeeuw, E. L., Boomsma, D. I., Bartels, M., & Finkenauer, C. (2018). Genetic and Environmental Influences on Self-Control: Assessing Self-Control with the ASEBA Self-Control Scale. *Behavior Genetics*. https://doi.org/10.1007/s10519-018-9887-1

Wincent, J. (2005). Does size matter? A study of firm behavior and outcomes in strategic SME networks. *Journal of Small Business and Enterprise Development*. https://doi.org/10.1108/14626000510612330

Yamin, M., & Kurt, Y. (2018). Revisiting the Uppsala internationalization model: Social network theory and overcoming the liability of outsidership. *International Marketing Review*. https://doi.org/10.1108/IMR-11-2014-0345

Zhou, P., Ang, B. W., & Poh, K. L. (2007). A mathematical programming approach to constructing composite indicators. *Ecological Economics*. https://doi.org/10.1016/j.ecolecon.2006.12.020

Airlangga HARTARTO is the Indonesian Coordinating Minister for Economy, Finance & Industry (2019-2024), and The Indonesian Minister of Industry (2016-2019). He earned his bachelor of mechanical engineering in 1987 from the University of Gadjah Mada. He earned two master degrees: (1) Master of Business Administration (Normadhi, #542) 1996 from Monash University, Australia, and (2) Master of Management Technology (MMT) 1997 from Melbourne Business School University, Australia. He got two awards of ASEAN Engineering Honorary Fellow Conferred by Asean Federation of Engineering Organization at Myanmar 2004, and the Australian Alumni Award for Entrepreneurship 2009.
ORCID ID: https://orcid.org/0000-0002-1401-0459

Jenri MP PANJAITAN has already accomplished his doctorate from the Study Program of Leadership and Innovation Policy, Gadjah Mada University. He earned his Doctorandus 1988 in International Relations from the Catholic University of Parahyangan Bandung and his Master of Law 2014 from Faculty of Law & Human Rights, Gadjah Mada University. Now, he works as an advisor staff in the Indonesian Ministry of Industry, especially in the Empowerment of Small Management Entity, Indonesia. His articles are in the Journal of Entrepreneurship in Emerging Economies, and Gadjah Mada International Journal of Business.
ORCID ID: https://orcid.org/0000-0003-3362-682X

Sumiyana SUMIYANA is a professor in accounting at the Faculty of Economics and Business, University of Gadjah Mada, Yogyakarta, Indonesia. He has some current additional works simultaneously that are (1) Vice-Director of Master in Management, Univesity of Gadjah Mada, (2) Managing Director of Wisma MMUGM Hotel, (3) Commissioner Board of Sleman Bank, and (4) Commissioner Board of Institute Science and Technology–AkPrind, Yogyakarta. Along with his works, he wrote the latest articles in 2017-2020. His articles are in the Journal of Entrepreneurship in Emerging Economies, Journal of International Studies, Behaviour & Information Technology, International Journal of Business Information Systems, Economics and Sociology, The Journal of High Technology Management Research, and Gadjah Mada International Journal of Business.
ORCID ID: https://orcid.org/0000-0002-1518-9681

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

ENTREPRENEURIAL PROJECTS' DEVELOPMENT: ALTERNATIVE SOURCES OF INVESTMENTS

Viktoriya Zabolotnikova [1], Irina Selezneva [2], Arzigul Nizamdinova [3], Tamara Mukhamedyarova-Levina [4], Sagynkul Praliyeva [5]

[1,2,4,5] Turan University, Satpaeva Street, 16a, Almaty, 050000, Kazakhstan
[3] Al-Farabi Kazakh National University, 71 al-Farabi Ave., Almaty, 050040, Kazakhstan

Abstract. This study aims at researching the possibilities of using alternative sources for financing small and medium-sized business projects. The main study method is a survey of 275 experts who are heads of small and medium-sized enterprises of the Republic of Kazakhstan. According to the obtained results, the access to financing is an urgent problem for most enterprises. Bank loans and overdrafts remain the main sources of attracting investments for the implementation of development projects. At the same time, a considerable number of companies that need financing were not able to obtain a bank loan or failed to obtain the full amount of the requested funds, and only a small part of the companies managed to raise the required bank financing. Companies face particular difficulties when attracting investments in startups. Despite the fact that nowadays there are many new options for financing startups, Kazakh entrepreneurs do not use them actively. In order to increase the chances for obtaining funds, companies must more actively attract alternative sources of financing for new projects. According to the survey, the most relevant sources of alternative startup financing for Kazakh entrepreneurs have been identified. These are grants, business angel financing, and crowdfunding. When implementing startups, companies can choose the most suitable financing option, or use several options.

1. Introduction

All entrepreneurs know that one of the biggest risks of owning and managing their own business is a financial risk. The first two years of a new business are crucial because almost two-thirds of the established companies fail during this critical period and stop their activity (Batashev et al., 2020). A new business cannot pay for personnel, materials, inventory, or marketing without a sufficient cash flow. If an entrepreneur does not have the resources to personally finance a business, financing needs to be arranged.

The sufficient access to the capital is one of the most important obstacles to overcome when establishing and developing a new business. Taking into account the important role of the entrepreneurship in ensuring the economic growth of the country, it is still not surprising that the strive to dilute the financial constraints faced by potential entrepreneurs is an important goal for central bodies around the world (Mazurina et al., 2020; Tarkhanova et al., 2020; Biryukov et al., 2020; Karshalova et al., 2018).

For example, in order to solve the problems of attracting financing, the government of the Republic of Kazakhstan pursues the policy aimed at developing and supporting the entrepreneurship. The measures of financial support for the entrepreneurship include loans from second-tier banks and microbanking, loans from the budget funds, partial guaranteeing of loans, leasing, etc.

At the same time, there is still a considerable gap between the need of business in investments and their actual offer. The lack of access to loans is one of the most important problems faced by Kazakh entrepreneurs because they are limited by the lack of collateral, the absence of the past experience of business valuation, and the occasional lack of the related experience.

Although bank lending is the most common source of external financing for many entrepreneurs, subject to considerable dependence on investment needs, traditional bank financing often creates problems for new, innovative, and rapidly growing small and medium-sized enterprises (SMEs) that have higher risk-return profile.

At the same time, in the world practice, there are alternative sources of investments that create an additional opportunity to raise funds. The strive of SMEs to improve the capital structure and reduce their dependence on borrowed funds substantiated the reasonability of studying alternative sources in financing entrepreneurial projects (Dudin et al., 2020; Auyezkhanuly et al., 2019).

Alternative sources of financing have not yet become widespread in the Republic of Kazakhstan due to the lack of active sites and investors, as well as the lack of government regulation instruments. At the same time, the use of alternative instruments will ensure the required financing of entrepreneurial projects by attracting private and currently inactive capital.

2. Literature review

The world of banking and financial services continues to change rapidly, and alternatives to traditional products and services are introduced more and more often (Daskalakis et al., 2013). Previously, financial technologies could be considered as applications of traditional financial services to the existing technologies, but today there are financial innovations with the involvement of previously unused markets (Abdulsale & Worthington, 2013).

Over recent years, the increasing number of financing options has become available for SMEs, although some of them are still at the early stage of development or are available only for few SMEs.

Alternative financial strategies are more and more important in assisting enterprises to meet their financial needs in the growth and contributing to the economy (Block et al., 2018; Serikbaeva et al., 2019).

Since the debt financing provides moderate return for lenders, and therefore it is suitable for low-moderate risk profiles, i.e., the companies that are characterized by stable cash flow, moderate growth, proven business models and access to collateral or guarantees, alternative financial instruments change this traditional risk sharing instrument (Eniola & Entebang, 2015).

These instruments consist of numerous and competing sources of financing for SMEs, including asset-based financing, alternative forms of debt, hybrid instruments, and equity instruments.

The transition to alternative financing channels is a reorientation to appropriate restructuring of debt and equity capital by providing the hybrid capital structure with a different degree of risk and return (Lawal et al., 2018).

The reasonability of using alternative sources of project investment depends on the risk-return profile, the stage of the business life cycle, management structure, and financial skills (Table 1).

Table 1. Suitability of Alternative Financial Instruments for Various Profiles and Stages of the Company's Activity

	Type of financial instrument	Company's Profile and Stage
Low risk/return	Asset-based financing (Kolpak et al., 2016; Bilgin & Dinc, 2019; Mol-Gomez-Vazquez et al., 2018; Zhang et al., 2019) – Asset-based lending – Factoring – Financing a purchase order – Warehouse certificate – Leasing	Startups Limited credit and no collateral firms Fast growing and strapped companies Companies with a solid customer base but high investments in intangible assets Venture and information-opaque companies Companies that often change their capital assets Commodity Producers and Traders
	Alternative financing (Parnes & Nippani, 2019; Gürtler & Neelmeier, 2019; Carbó-Valverde, Rosen & Rodríguez-Fernández, 2017) – Corporate bonds – Securitized debt – Mortgage bonds – Private placement	Large and medium-sized companies with stable profits and relatively low cash flow volatility Companies investing or using growth opportunities Companies that do not want the dilution of ownership and control Small companies with limited public market opportunities
Medium risk/return	Hybrid instruments (Svědík & Tetřevová, 2015; Tetrevova, 2009; Swedick & Tetrevova, 2014; Franke & Hein, 2008) Subordinated loans/bonds Quiet investor participation Profit sharing rights Convertible bond Warrant bonds Mezzanine financing	Young fast-growing companies strive for cheaper expansion capital than venture capital, and for the weakening of control Created companies with new growth opportunities Companies undergoing the transition period and restructuring Companies striving to strengthen the capital structure Companies with well-established and stable profitability and market position
High risk/return	Direct investments	
	Business angel financing (Granz et al., 2020; Block et al., 2019; Ang et al., 2018) Crowdfunding (Mollick, 2014; Gruzina et al., 2016; Lehner et al., 2015) (equity)	Companies at the initial and early stage Innovative enterprises requiring investment and business building skills
	Venture capital (Repullo & Suarez, 2004; Rutskiy et al., 2020; Frank et al., 2008)	Companies at the initial, early and late stages of investment Companies with high growth potential that can generate high profits in a short time

	Other private investments (Brown et al., 2017)	Mature companies restructuring or changing ownership
		Companies in troubles with the rescue potential
	Public capital (Macaulay, 2019; Aust et al., 2020)	
	Specialized platforms for public listing of SMEs	Young, innovative, and risky small companies
		Companies with highly structured management systems and extensive disclosure

Source: Compiled by Authors

Thus, scientific references rather adequately cover the theoretical aspects related to the development of alternative sources of financing. However, there is insufficient number of studies on financial and nonfinancial barriers that hinder their use in investing entrepreneurial projects.

This study aims at investigating the barriers to financing entrepreneurial projects and identifying the possibility of attracting alternative sources of investment in the Republic of Kazakhstan.

The hypothesis of the study is the assumption that a more diversified set of financing options will allow SMEs to attract additional financial resources for the implementation of business projects.

3. Methods

The study is based on qualitative indicators obtained as a result of surveying 275 companies in the Republic of Kazakhstan.

The sample companies were randomly selected from the business register of the Republic of Kazakhstan (Businessnavigator, 2020). The sample was formed in order to ensure the comparable data accuracy for 155 small (21 – 30 employees) and 120 medium-sized (101 – 150 employees) Kazakh companies.

Typical SMEs included in the sample were SMEs with different business experience: 21.8 % of the surveyed companies had been operating for less than six months, 23.6 % – from six months to one year, 48 % – from one year to three years, and 6.6 % of the respondents had more than three-year experience.

The industry sample structure was as follows: trade enterprises – 38.2 %, construction companies – 23.3 %, transport and warehousing companies – 17.1 %, accommodation and food companies – 13.1 %; and industrial enterprises – 8.4 %.

The answers were given by the senior management (as a rule, the business owner or managing director) that could directly talk about financing the business under consideration and were either fully or partially responsible for financial decisions in their company.

The survey was carried out as a questionnaire with ten questions. In questions No. 1, 2, and 5, the respondents were asked to indicate the relevance of a particular problem according to the scale from one (not relevant) to ten (extremely relevant). After the survey, each response was analyzed and processed.

4. Results

According to the survey, the access to financing as the main obstacle to business development is identified by more than 70 % of the surveyed experts (Figure 1).
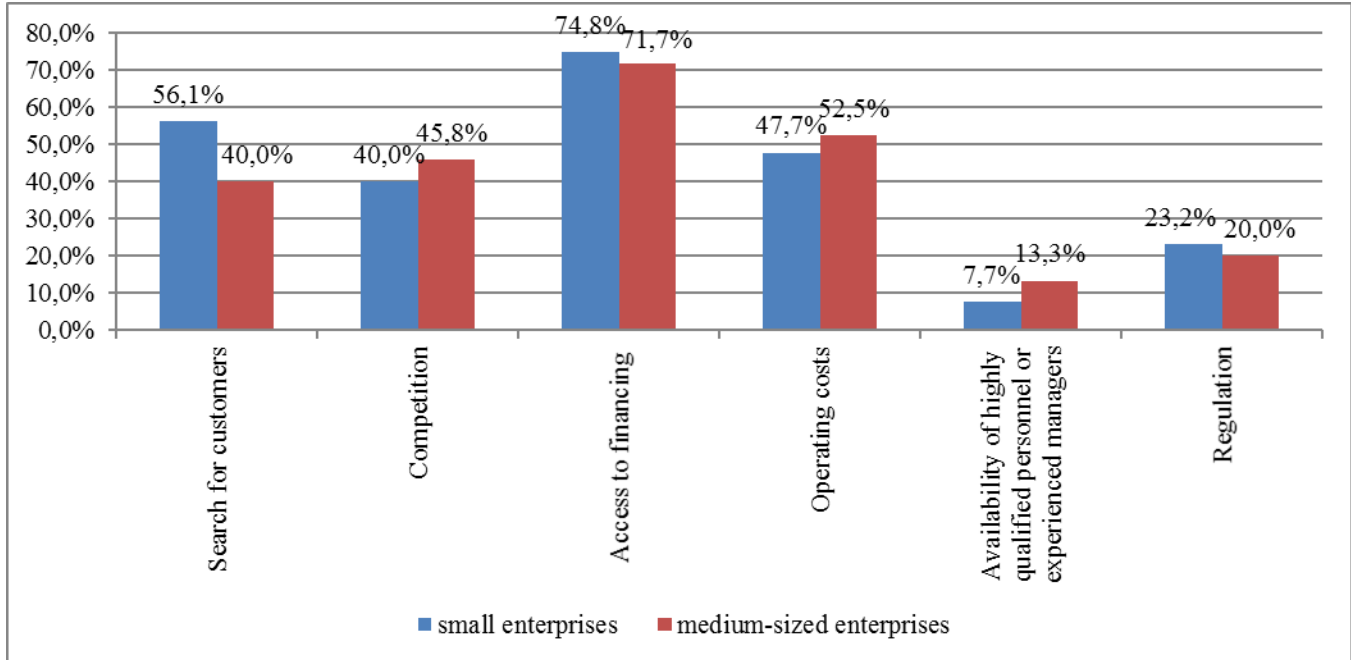
Fig. 1. The most important problems faced by Kazakh SMEs
Source: Compiled by Authors

The access to financing was a more relevant problem for small enterprises (74.8 %). The access to financing as an important problem was noted by the experts from medium-sized enterprises a little less frequently.

Over the past 12 months, 73 % of the surveyed companies had used external financing. Approximately one quarter of the companies' representatives noted that they had not used external financing.

The experts called bank loans and overdrafts as the most relevant sources of attracting investments (Figure 2). About 54 % of the surveyed SMEs representatives considered bank loans, and 56 % considered bank overdrafts as relevant.
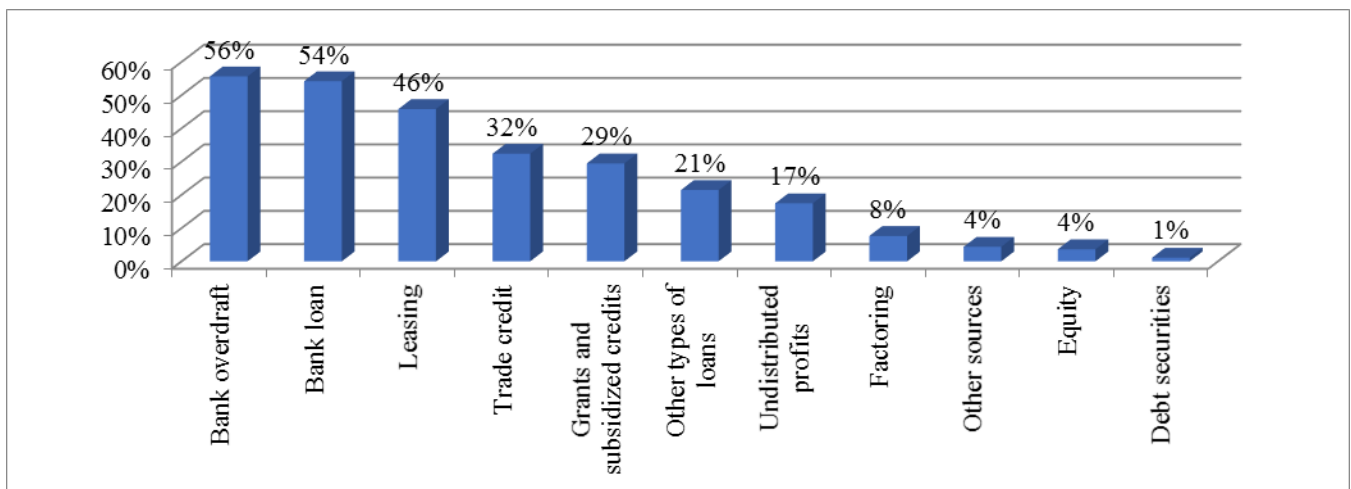
Fig. 2. The structure of financing of the Kazakh SMEs
Source: Compiled by Authors

Leasing and trade credit were also relevant for 46 % and 32 % of SMEs, respectively. In addition, 29 % of the respondents indicated that grants and subsidized loans, which involved support from government sources in the form of guarantees or other interventions, were important in financing their entrepreneurial projects.

Other loans, e.g., from the family, friends, or related companies, were important sources of financing for 21 % of the Kazakh SMEs. Internal funds were important as an alternative source of financing. This was indicated by 17 % of the experts. The share capital, factoring, other sources, and debt securities had impact on the access to financing of companies (safes) mentioned as relevant by less than 10 % of the SMEs.

About 46 % of the respondents (126 experts) believed that bank loans were not relevant. Sixty-two experts out of them (49.2 %) believed that their companies did not need this type of financing, and 11 % indicated that bank loans were not relevant due to high interest rates and other costs. Other experts reported other reasons of the inexpediency of bank loans (Figure 3).
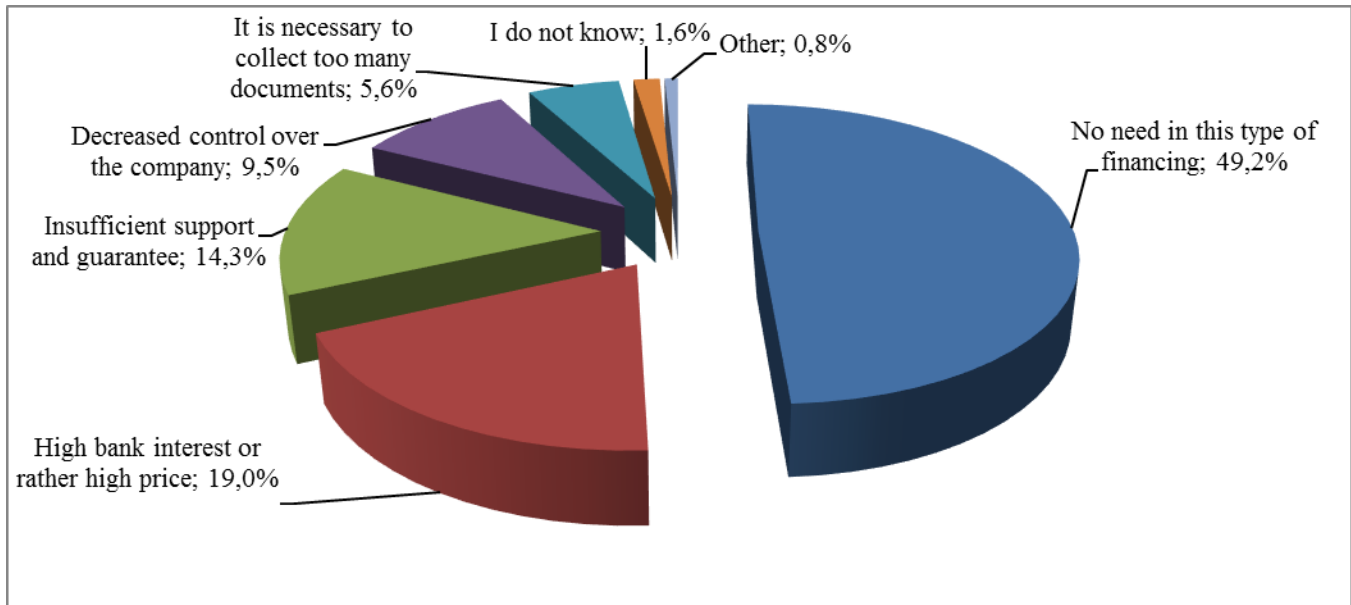
Fig. 3. Reasons why bank loans are not relevant for Kazakh SMEs
Source: Compiled by Authors

About 42.5 % of the surveyed experts said that over the past year the needs of their companies in bank lending (with the exception of overdraft and credit lines) had increased.

28.7 % of the experts reported the decrease in the need in this type of project financing, which caused the net increase in needs by 13.8 % (Figure 4).
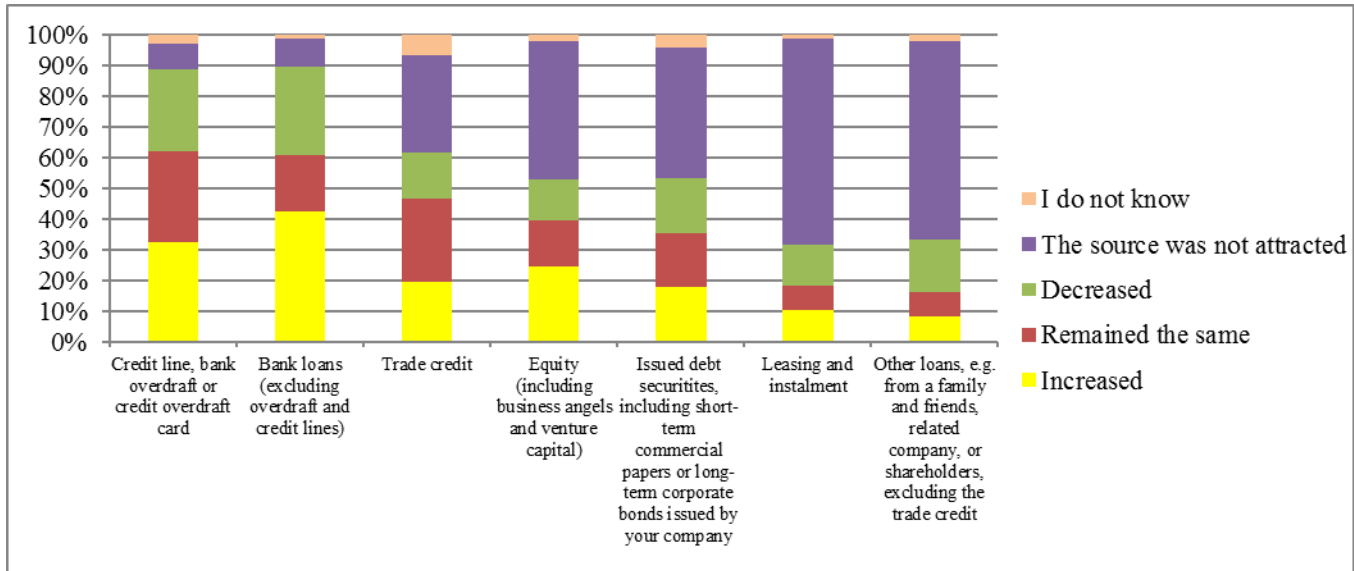
Fig. 4. Changes in the need for various types of financing to implement entrepreneurial projects in the Republic of Kazakhstan
Source: Compiled by Authors

The net increase in financing needs was noted on credit lines and overdrafts, trade loans, as well as in raising the capital by selling shares, including financing of business angels and venture financing.

The number of the companies that noted the decrease in need for such financial sources as leasing and other loans, including loans from friends and family, related companies, etc.

According to the expert survey, the largest investments were directed towards the implementation of projects related to the acquisition/renovation of fixed assets (36 %) and the replenishment of the working capital associated with the business expansion (34.2 %) (Figure 5).
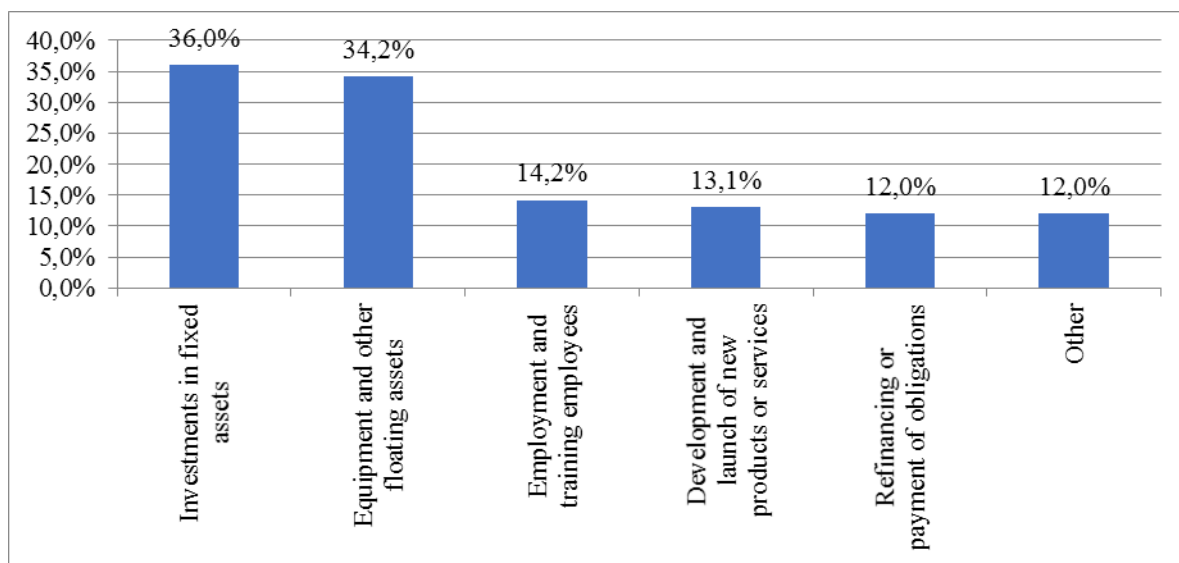
Fig. 5. Objectives of using external financing over the recent six months
Source: Compiled by Authors

259

Other specific categories included the development and launch of new products or services (13.1 %), hiring and training of employees (13 %), and refinancing or repayment of obligations (14.2 %).

The survey results show that the percentage of the companies that need bank financing but did not obtain loans from financial institutions of Kazakhstan, is quite high and amounts to 25.8 % (Figure 6).
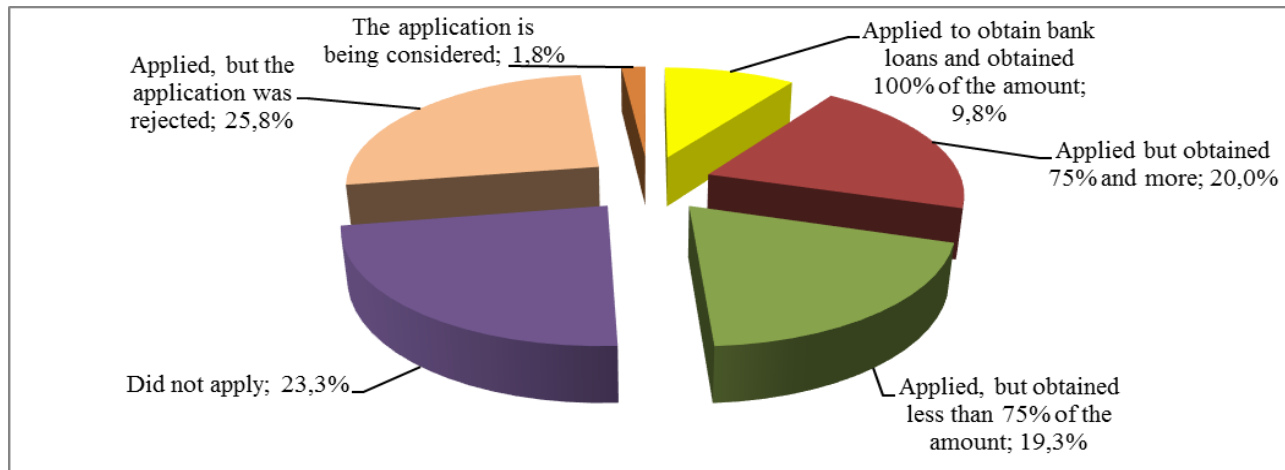
Fig. 6. Assessment of the availability of bank financing for Kazakh SMEs
Source: Compiled by Authors

According to the survey, almost half (49 %) of the SMEs had applied for bank loans, but were not financed as planned.

The experts noted that over recent years their companies had had more opportunities to use a wide range of alternative financing instruments, although some of those instruments had still been at the early stage of their development or in their current form had been available only to a small part of the SMEs (Figure 7).
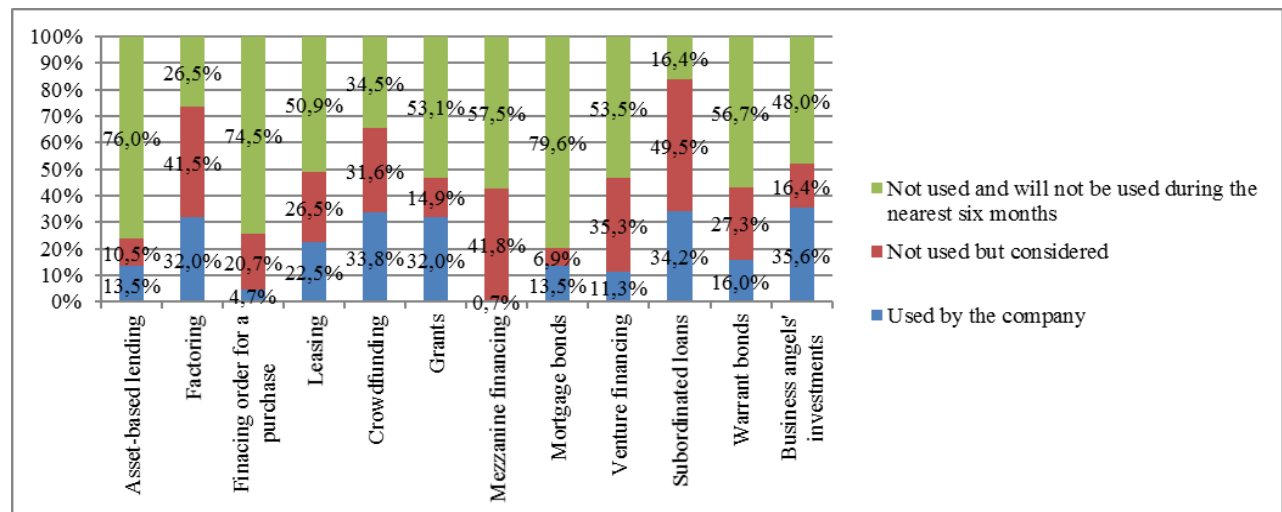
Fig. 7. Use of alternative sources of financing by Kazakh SMEs
Source: Compiled by Authors

Thus, the results of the study show that, despite the relatively high need of Kazakh SMEs in external financing, alternative sources of investment are poorly used. This is largely due to the lack of financial literacy about the possibility to use these types of investments when implementing entrepreneurial projects.

5. Discussion

According to the study results, nowadays companies are sufficiently informed about the possibilities of using such alternative sources as leasing, crowdfunding, grants, subordinated lending, venture and business angel financing.
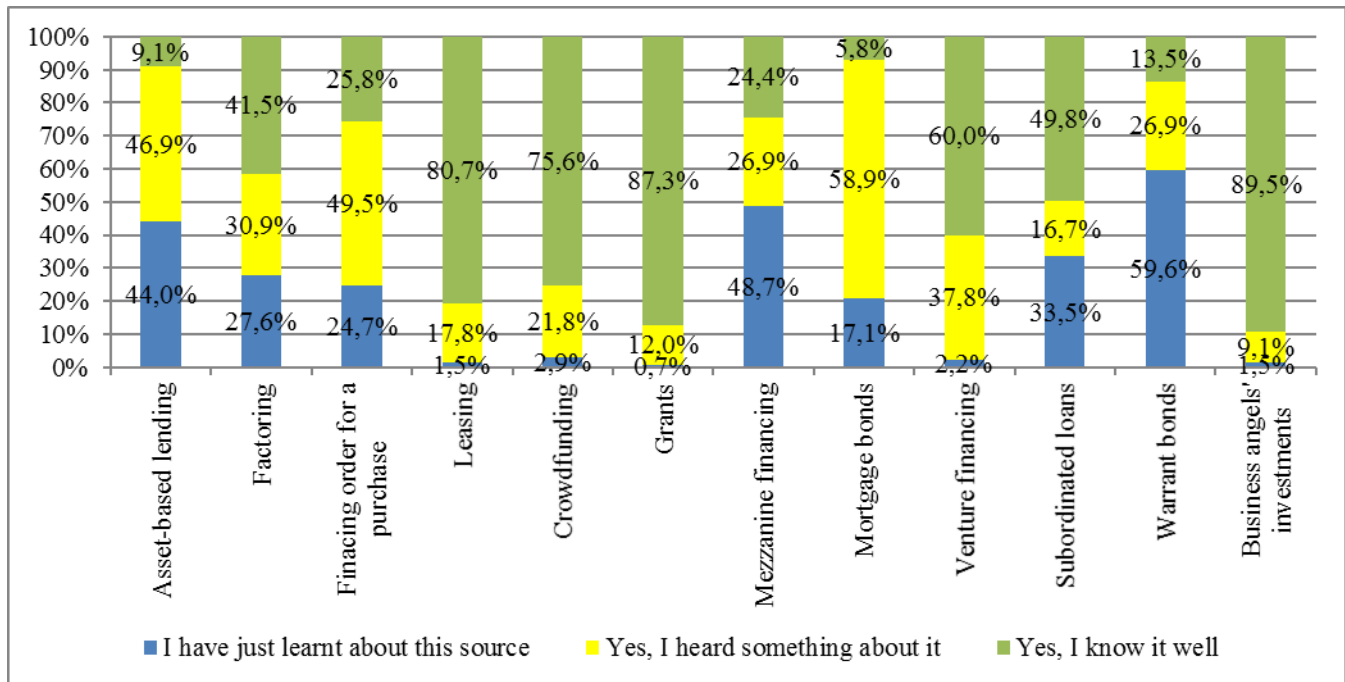
Fig. 8. Awareness of entrepreneurs about alternative sources of financing projects in the Republic of Kazakhstan
Source: Compiled by Authors

At the same time, rather high percentage of the respondents stated that they had had no idea about such financial sources as asset-based lending, mezzanine financing, warrant bonds, and subordinated loans.

According to more than half of the experts (53.5 %), the most promising sources of project financing for new and growing companies were grant financing (Figure 9).
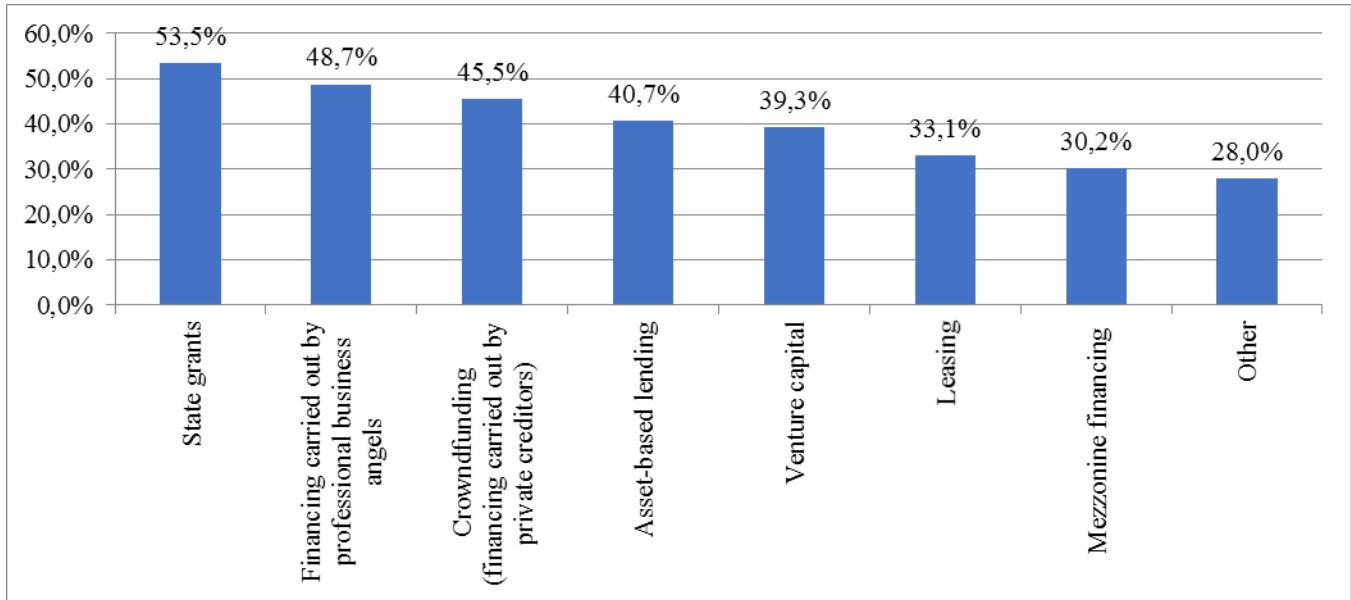
Fig. 9. Promising sources of project financing for new and growing SMEs
Source: Compiled by Authors

State grants for entrepreneurial purposes are provided for by the *Enbek Program for the Development of Productive Employment and Mass Entrepreneurship for 2017 – 2021* and the *Business Roadmap* 2025 Unified Business Support and Development Program (BR-2025). According to the *Enbek Program*, state grants are provided in the amount of 200 MCI (monthly calculation index, 1 MRP – 2,651 tenge), i.e., this year it is 530,200 tenge. According to the BR-2025 Program, state grants are up to 3 mln tenge. According to the *Enbek Program*, the persons who have not previously obtained a grant under this program, including young people, members of low-income families, employable persons with limited liability, migrants and repatriates, can apply for a state grant. According to the BR-2025 Program, the applicants may be citizens who have an innovative business idea. Business angel financing (48.7 % of the respondents) and crowdfunding (45.5 %) can become considerable sources of attracting investments for newly created companies.

According to the study carried out by the European Trade Association, for business angels, seed funds, and early stage market players (EBANs), the main reason that reduces the willingness of business angels to invest is the high risk of failure (EBAN, 2018). Therefore, in the Republic of Kazakhstan it is necessary to create the relevant conditions for private investors. The mitigation of risk is a key element in achieving the goal, and the government of the Republic of Kazakhstan can use two instruments for this. In addition to creating a tax incentive scheme for investors investing in startups that allows them to deduct their taxes directly when investing, the creation of co-investment funds is an important political opportunity.

The launch of joint investment funds with business angels has proven to be an efficient way to attract "new money" in many countries, as well as expert knowledge from the market, helping to finance thousands of innovative companies (European Commission, 2016). Schemes of joint investment with business angels are of additional value to government bodies as compared to grants because their leverage is higher. Co-investment schemes are also valuable for angels because they reduce risk and allow more investments.

Usually, two scenarios arise as a result of creating the co-investment funds of business angels:

1) Public-private investment funds help to create investment communities at the early stages and, thus, create a favorable cycle. Private and public entities do not invest alone anymore. The investment risk is diluted on both sides, and also contributes to the perception of "political" risks.

2) It is possible to attract more funds for the ecosystem and more investments by combining several parties into a common financing mechanism. Management fees are also lower as compared to venture capital funds.

Some of the key features of co-investment funds that have impact on the community's successful understanding of business angels include asymmetric exits, tax incentives, and management fees.

In order to create conditions for the development of business angel financing in the Republic of Kazakhstan, it seems reasonable to consider the international experience in implementing measures to support this type of SEMs financing in some European countries (France, the United Kingdom, and Italy).

These incentives include government guarantees, lowered tax rates, or tax credits. It is necessary to note that wherever there are tax incentives, there is also considerable activity of business angels.

In France, business angels benefit from the reduction of income tax in the amount of 18 % of the investments. A new incentive measure for business angels to finance innovative companies, similar to PEAs adopted in other countries of the world is the SMEs innovation account (ICC). The SMEs innovation account aims at facilitating the financing of SMEs by deferring taxation on capital gains for the entire investment term.

In Italy, the capital gain obtained by business angels (residents and nonresidents) that is not related to the entrepreneurial activity is exempt from taxes if

a) The shares held had been personally renewed during the three years preceding the disposal,

b) The company the shares were granted to had been established not earlier than seven years prior to the disposal, and

c) The capital income is invested in acquiring shares in companies that are not older than three years old, and provided that they carry out the same entrepreneurial activity as the company whose shares were distributed.
The UK benefits from two schemes.

1) Assistance to entrepreneurs: it is mainly focused on entrepreneurs and provides for the first 10 mln pounds of the growth in lifetime income from the relevant business assets with the tax of 10 %.

2) Enterprise investment scheme (EIS):

In order to meet the requirements of venture capital funds, income tax benefits were increased, while the amount of advance tax benefits on income tax increased from 20 % to 30 %. In addition, the law provides for deferred capital gains tax (CGT).

According to 45.5 % of the experts, crowdfunding is a relevant source of financing. It is necessary to pay attention to its development.

Crowdfunding is a new source of financing startups that includes open calls to the public, usually via the Internet, to finance projects by making cash contributions in exchange for remuneration, pre-order of a product, lending, or

investing. Due to new information and communication technologies, crowdfunding lending-based platforms are a new way of financial intermediation by directly connecting lenders and borrowers through online platforms.

One of the biggest obstacles crowdfunding platforms face in their efforts to offer their services is the lack of common rules. This increases compliance and operating costs and prevents the expansion of crowdfunding platforms.

According to the analysis of the current practice of regulating crowdfunding lending platforms in the world, countries choose various regulatory approaches for crowdfunding lending-based platforms. A number of countries (France, Great Britain, and Israel) adopted special legislation that directly regulates the activities of credit crowdfunding platforms.

Other countries have introduced the crowdfunding regulation that is either applied to both credit and investment crowdfunding, or does not distinguish between the two business models (Austria, Belgium, Finland, Mexico, and Portugal).

In the countries where there is no lending-based crowdfunding regulation, platforms are adapted to the existing regulation of securities trading, banking or payment institutions. For example, in the Netherlands, consumer-business platforms must obtain individual permission for brokering from the Dutch Authority for Financial Markets, while consumer-consumer platforms require a lender license.

In Sweden and Denmark, credit platforms function as payment institutions, while in Norway they are registered as credit intermediaries. In France, where there is still a banking monopoly on consumer loans, a consumer-consumer platform had been licensed as a credit institution. In Estonia, consumer lending platforms are regulated as consumer lending by the financial supervisory authority, while consumer lending to businesses is not regulated. In Ireland, platforms operate without any legal status as a financial intermediary.

The experts recommend the following as priority measures that should be taken into account when developing the regulatory framework for the functioning of crowdfunding platforms in the Republic of Kazakhstan:

− To set minimum requirements to the capital. About 56.7 % of the experts believe that it is necessary to set minimum capital requirements to platforms. This is necessary for the platforms to be able to cover operating or compliance costs in case of a financial crisis.

− About 53.5 % of the experts noted that when determining requirements for the platforms, they should be obliged to maintain such systems and control means that would allow identifying, managing, tracking, mitigating, and reporting risks within and for their business. Risks may include operational risk, cybersecurity, personal data protection, and the risk that the platform can be used to commit financial crimes.

− According to 44.4 % of the experts, it is necessary to regulate the issues of platform responsibility for identifying, managing, mitigating, and reporting on conflicts of interest.

− More than 35.7 % of the experts mentioned that specific business conduct requirements should be regulated to ensure the proper disclosure of information to investors and issuers/borrowers for them to understand how the platform worked, especially the information about the methods of how the platform earned its income.

− According to 32.4 % of the experts, the law must guarantee that platforms can, but are not required to, offer automated instruments related to diversifying investor portfolios.

The above recommendations are an incomplete list of the best practices the experts should take into account when developing the regulatory framework that regulates the activities of crowdfunding platforms in the Republic of Kazakhstan.

Conclusions

The results of the study have confirmed the hypothesis set herein about the possibility of using alternative sources of financing in order to attract investments in the implementation of entrepreneurial projects.

The results obtained during the study make it possible to conclude that for 40 % of the surveyed companies, the access to financing is a limiting factor in their business development. At the same time, 42.5 % of the experts mentioned the increasing need for external financing. At the same time, for new start-up companies, the availability of bank lending remains low.

At the present time, there are many sources of financing that are a real alternative to bank lending. However, they have not yet been widely used in the Republic of Kazakhstan.

According to the experts, for the Republic of Kazakhstan, the most relevant sources of financing entrepreneurial projects, especially start-ups, include state grants, business angel financing, and financing from private lenders through crowdfunding platforms.

References

Abdulsale, A. M., & Worthington, A. S. (2013). Financing of small and medium-sized enterprises: a literature review. *International Journal of Business and Management, 8*(14), 36-54. http://dx.doi.org/10.5539/ijbm.v8n14p36

Ang, A., Chen, B., Goetzmann, W. N., & Phalippou, L. (2018). Estimating Private Equity Returns from Limited Partner Cash Flows. *Journal of Finance, 73*(4), 1751-1783. https://doi.org/10.1111/jofi.12688

Aust, V., Morais, A. I., & Pinto, I. (2020). How does foreign direct investment contribute to Sustainable Development Goals? Evidence from African countries. *Journal of Cleaner Production, 245*, 118823. https://doi.org/10.1016/j.jclepro.2019.118823

Auyezkhanuly, A., Almagul, M., Akpanov, A., & Karshalova, A. (2019). The Study of the Residential Real Estate Market in the Republic of Kazakhstan. *Journal of Real Estate Literature, 27*(1), 117-133.

Batashev, R.V., Nikonovich, S.L., Kalafatov, E.A., Polezharova, L.V., Mironova, E.A., & Kovalevskaia, N.V. (2020). Indicators of Tax Evasion: Dynamics and Transformation. *Journal of Advanced Research in Dynamical and Control Systems, 12*(3), 597-607. https://doi.org/10.5373/JARDCS/V12SP3/20201297

Bilgin, R., & Dinc, Y. (2019). Factoring as a determinant of capital structure for large firms: Theoretical and empirical analysis. *Borsa Istanbul Review, 19*(3), 273-281. https://doi.org/10.1016/j.bir.2019.05.001

Biryukov, V. A., Dmitrieva, O. V., Frolova, V. B., Nikandrova, L. K., & Arkhipov, A. B. (2020). Formation of a Tourism Entrepreneurial Environment in the Conditions of Competition. *Journal of Environmental Management and Tourism, 10*(8), 1779-1784.

Block, J. H., Colombo, M. G., Cumming, D. J., & Vismara, S. (2018). New players in entrepreneurial Finance and why they are there. *Small Business Economics, 50*(2), 239-250. https://doi.org/10.1007/s11187-016-9826-6

Block, J., Fisch, C., Vismara, S., & Andres, R. (2019). Private equity investment criteria: An experimental conjoint analysis of venture capital, business angels, and family offices. *Journal of Corporate Finance, 58*, 329-352. https://doi.org/10.1016/j.jcorpfin.2019.05.009

Brown, R., Jenkinson, T., & Stoff, I. (2017). How constant are direct investment indicators? Evidence from transaction level data. *Journal of Financial Economics, 123*(2), 273-291.

Businessnavigator (2020). *Regional map of entrepreneurship development of the Republic of Kazakhstan*. Retrieved from: http://www.businessnavigator.kz/ru/regional-map

Carbó-Valverde, S., Rosen, R.J., & Rodríguez-Fernández, F. (2017). Are covered bonds a substitute for mortgage-backed securities? *Journal of Economic Policy Reform, 20*(3), 238-253. https://doi.org/10.1080/17487870.2017.1293537

Daskalakis, N., Jarvis, R., & Shizas, E. (2013). Financing Practices and preferences for micro and small firms. *Journal of Small Business and Enterprise Development, 20*(1), 80-101. https://doi.org/10.2139/ssrn.1683182

Dudin, M. N., Shakhov, O. F., Ysotskaya, N. V., & Stepanova, D. I. (2020). Public and Private Partnership: Innovation-Driven Growth of Agriculture at the Regional Level. *Journal of Environmental Management and Tourism, 10*(7), 1435-1444.

EBAN. (2018). *Why Business Angels Do Not Invest. Findings on obstacles preventing investment in startups*. Retrieved from: http://www.eban.org/wp-content/uploads/2018/02/EBAN-Report-Why-Business-Angels-Do-Not-Invest.pdf

Eniola, A. A., & Entebang, H. (2015). SME firm performance-financial innovation and challenges. *Procedia-Social and Behavioural Sciences, 195*, 334-342.

European Commission. (2016). *Fostering business angel activities in support of SME growth Guidebook Series How to support SME Policy from Structural Funds*. Retrieved from: https://op.europa.eu/en/publication-detail/-/publication/cf4dcc4d-cfc4-11e5-a4b5-01aa75ed71a1

Frank, N., Gruber, M., Harhoff, D., & Henkel, J. (2008). Venture capitalists ' assessment of startup teams: compromises, knockout criteria, and the impact of venture investment experience. *Entrepreneurship: Theory and Practice, 32*(3), 459-483. https://doi.org/10.1111/j.1540-6520.2008.00236.x

Franke, G., & Hein, J. (2008). Securitization of mezzanine capital in Germany. *Financial markets and portfolio management, 22*(3), 219-240. https://doi.org/10.1007/s11408-008-0082-x

Granz, C., Henn, M., & Lutz, E. (2020). Research on Venture Capitalists' and Business Angels' Investment Criteria: A Systematic Literature Review. In: *FGF Studies in Small Business and Entrepreneurship* (pp. 105-136). Springer. https://doi.org/10.1007/978-3-030-17612-9_5 ·

Gruzina, Y. M., Zeinalov, A. A., Ilienkova, N. D., & Ilienkov, D. A. (2016). Crowd investing as a perspective instrument of financing small and middle-sized businesses in the Russian Federation. *Journal of Applied Economic Sciences, 11*(8), 1650-1660.

Gürtler, M., & Neelmeier, P. (2019). Risk assessment of mortgage covered bonds: International evidence. *Finance Research Letters, 28*, 292-298. https://doi.org/10.1016/j.frl.2018.05.004

Karshalova, A. D., Markhayeva, B., Aitkazina, M. A., & Mukushev, A. (2018). Improvement of management accounting in the context of uncertainty and risks in the food retailing sector in the republic of Kazakhstan. *Journal of Applied Economic Sciences, 8*(54), 2275-2283.

Kolpak, E. P., Gorynya, E. V., Shaposhnikova, A. I., Khasenova, K. E., & Zemlyakova, N. S. (2016). Special aspects of leasing activities and its meaning in conditions of enterprise competitiveness. *International Review of Management and Marketing, 6*(6), 126-133.

Lawal, F. A., Iyiola, O. O., & Adegbuyi, O. A. (2018). Exploring alternative financing for entrepreneurship development in Nigeria: Surmounting challenges. *Journal of Entrepreneurship Education, 21*(2), 11.

Lehner, O. M., Grabmann, E., & Ennsgraber, C. (2015). Entrepreneurial implications of crowdfunding as alternative funding source for innovations. *Venture Capital, 17*(1-2), 171-189.

Macaulay, C. R. (2019). Smaller firms and public equity: New platforms with old problems. *International Journal of Globalisation and Small Business, 10*(3), 248-277. RePEc:ids:ijgsbu:v:10:y:2019:i:3:p:248-277

Mazurina, T. Y., Matkovskaya, Y. S., Neopulo, K. L., Rogulenko, T. M. (2020). Studying the impact of the depreciation policy on the development of innovation potential of industrial enterprises. *Entrepreneurship and Sustainability Issues, 7*(3), 1513-1526.

Mol-Gomez-Vazquez, A., Hernandez-Qantas, G., & Keter-Kant, J. (2018). Legal and institutional determinants of factoring in SMEs: an empirical analysis in 25 European countries. *Journal of Small Business Management 56*(2), 312-329.

Mollick, E. (2014). The dynamics of crowdfunding: An exploratory study (Open Access). *Journal of Business Venturing, 29*(1), 1-16.

Parnes, D., & Nippani, S. (2019). The integration of mortgage and capital markets: a tale of two administrations. *Journal of Financial Economic Policy, 11*(3), 405-431.

Repullo, R., & Suarez, J. (2004). Venture capital finance: A security design approach. *Review of Finance, 8*(1), 75-108.

Rutskiy, V. N., Tsarev, R. Y., & Titov, I. A. (2020). Efficiency of crowdfunding as institution of global market for venture capital. *IOP Conference Series: Earth and Environmental Science, 421*(3), 032057.

Serikbaeva, G. G., Bektanov, B., & Bekturganova, A. (2019). Sources of Attracting Investments in Technological Innovation Projects to Ensure the Sustainable Development of Rural Areas. *Journal of Environmental Management and Tourism, 10*(4), 935-941.

Svědík, J., & Tetřevová, L. (2015). Mezzanine capital in the form of participating and subordinated loans as a source of financing metallurgical enterprises. *Proceedings of the METAL 2015 - 24th International Conference on Metallurgy and Materials*, pp. 2100-2105. Brno.

Swedick, J., & Tetrevova, L. (2014). Mezzanine financial instruments as alternative sources of financing for industrial enterprises. *Proceedings of the METAL 2014 – 23th international conference on metallurgy and materials*, pp. 1908-1913. Brno.

Tarkhanova, N. P., Kosheleva, T. N., Vasilchikov, A. V., & Ksenofontova, T. Y. (2020). Public-Private Partnership as an Instrument for Regional Entrepreneurial Development. *Journal of Advanced Research in Dynamical and Control Systems, 12*(1), 544-548.

Tetrevova, L. (2009). Mezzanine Finance and corporate bonds. *Finance: challenges of the future, 8*(9), 145-150. https://doi.org/10.3846/bme.2018.2205

Zhang, Y., Zhai, L., & Sun, H. (2019). Does the level of financial leasing matter in the impact of bank lending on economic growth: Evidence from the global market (2006–2016). *Finance Research Letters, 30*, 352-359. https://doi.org/10.1016/j.frl.2018.10.020

Viktoriya ZABOLOTNIKOVA
ORCID ID: https://orcid.org/0000-0002-5320-0757

Irina SELEZNEVA
ORCID ID: https://orcid.org/0000-0002-5470-5060

Arzigul NIZAMDINOVA
ORCID ID: https://orcid.org/0000-0003-3507-5216

Tamara MUKHAMEDYAROVA-LEVINA
ORCID ID: https://orcid.org/0000-0003-0223-8242

Sagynkul PRALIYEVA
ORCID ID: https://orcid.org/0000-0003-3924-905X

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:
@Entrepr69728810

PERCEPTION OF "GREEN SHIPPING" IN THE CONTEMPORARY CONDITIONS[*]

Olha Prokopenko [1], Radosław Miśkiewicz [2]

[1]*Tallinn University of Technology, 5 Ehitajate tee, 19086 Tallinn, Estonia*
[2]*Silesian University of Technology, 26 Roosevelt Street, 41-800 Zabrze, Poland*

E-mails: [1] prokopenko.olha.w@gmail.com (Corresponding author)*

Abstract. The article aims at substantiating the importance and relevance of the "green shipping" concept, as well as updating approaches to its understanding in the context of the COVID-19 pandemic. Besides, the article discusses the tools by which there can be achieved the goals of the classical concept, as well as the tools that can be implemented as part of a so-called "primary block" – humanity-friendly part of the updated "green shipment" concept. The purpose of the article is to give grounds to promising areas of investment in "green shipping" projects under the influence of the COVID-19 pandemic, as well as to review the instruments to increase the biological safety of vessels to ensure the financial stability of shipment companies. This article explains the necessity to reconsider the "green shipping" concept, which, under the influence the COVID-19 pandemic, cannot remain the same any longer. The authors proved that achieving total ecological friendliness does not mean the full safety of shipping, and, in their opinion, apart from realizing other fundamental tasks, "green vessels" must become friendly to humanity. There are accumulated the main instruments, which are the part of eco-friendly shipping and are the objects of international investments, and there are proposed the fundamentally new ones. This paper creates the basis for further fundamental research aimed at updating "green shipping" concept under the influence of unfavourable economic and social environment in order to maintain financial stability of all stakeholders engaged in international investments in shipping.

1. Introduction

The development of modern society is impossible without some global, powerful and dynamic movers. As the population of the planet is constantly growing, these movers are permanently connected with satisfying our growing needs (Bashynska & Dyskina, 2018). From delivering passengers, their luggage and mail to transporting oil, natural resources, heavy machinery and unified containers – all these are the tasks to be solved. The dynamics of international economic relationships even during the last two decades gives us all grounds to believe that the role of cargo and passenger transportation increases each year. As an example, we cite the dynamics of growth in the world port container traffic, which has grown during the past decade from 500 mln. of twenty-foot equivalent units in 2000 to almost 800 mln. in 2018 (UNCTAD, 2019). The similar situation is observed in the cruise line transportation: for the last ten years the quantity of passengers carried by cruise liners has grown by the same 1.5 times – from 21 mln. of people in 2010 to 32 mln. in 2019 (Statitsa, 2019). However, if the rail and road transport have some obvious continental limitations to be used freely and air transport is pretty expensive and has frames of useful loading, a particular type of movers has unconditional benefits: high carrying capacity and huge consignments; the ability to deliver both people and goods over unlimited distances, and comparably lower tariffs. These movers are the global fleet, global shipping.

For the centuries, the fleet of passenger and cargo ships has created conditions for discovering new territories, finding new countries and providing further opportunities for their economic growth and development. The past six - seven decades, the volume of shipping has increased several times. Besides, a mighty industry of sea tourism has been created.

All facts mentioned earlier only prove the necessity and considerable economic importance of developed shipping in the modern world and, without any doubts, the world of the future.

The most general understanding of "green shipping" assumes using the resources and energy by different types of both cargo and passenger vessels in such a way that prevents pollution made by ships as well as reduces shipping impact on global environment (Viana et al., 2020).

The current situation, especially the problem of COVID-19 pandemic, highlighted that shipping might bring not only new opportunities but also severe difficulties and challenges to be tackled.

Another fundamental problem is to make investments and distribute international financial flows in the sphere of shipping. During recent years, a lion's share of investments has been sent to rebuilding, reconstruction of old infrastructure and designing a new one. Today, the ports of Shanghai, Singapore, Hong Kong, Shenzhen, Busan, Ningbo-Shoushan, Guangzhou, Qingdao are not only the cargo terminals but an alliance of thousands of companies and millions of people. Moreover, modern passenger terminals are real art masterpieces attracting tourists and providing the development of business both for local territories and countries as a whole.

As it was considered before, such concentration of people, simultaneously with significant opportunities, brought a lot of fundamental problems of environmental, social, economic and, without exaggeration, healthcare character.

Such kind of a situation dictates new requirements to vessel design, planning and construction of modern ports, which guarantee the safety and health protection for direct and indirect participants in the shipping process, as well as assessment of all risks brought by new challenges.

This is a big task for new investment flows and, obviously, may be solved during several next years. However, today, we see the direction of movement and know what problems are in priority to organize further investments.

This paper is devoted to the explanation of modern challenges and the search for tools to solve the problems mentioned.

2. Theoretical Background

The problems of investing in green technologies are thoroughly and deeply studied today by many scientists and practitioners. Special attention is paid in the literature to a relatively new trend in science, which is called the concept of "green shipping." Different aspects of investments into technologies as the part of Sulphur Emission Control Areas (SECA) with relevant calculations of NPV and WACC, ROV and ROA of such investments were estimated (Atari et al., 2019). The impact of shipment on the CO2 emission (Bhattar, 2019) was reviewed as to specificity of investments into innovations, port infrastructure, vessels, and shipment.

The role of modern shipment (Lauer et al., 2007) is considered in the process of spreading dangerous sulphate burden, black carbon burden, aerosols generating and radiation pollution. There is given exact characteristic of regional spreading of hazardous materials and the rate of biologic hazard at different parts of the planet. Another work by Lindstad et al. (2015) considers the main types of substances polluting the oceans and seas, analyses the influence of each of them on the atmosphere, hydrosphere and living organisms, as well as studies the contribution each of these substances to environmental pollution. It is shown how ecological aspects of shipping affect consumer choice (Prokopenko, 2011). It is also shown that the development of green shipping enhances the competitiveness of ports and other participants in shipping infrastructure (Kitzmann et al., 2020).

The article by Metzger and Schinas (2019) is dedicated to explaining the gap between the level of financing and the net present value within green investment projects. In the framework of investment projects in the field of green shipment, methodologies of the Fuzzy Pay-Off Method (FPOM) and the Centre of Gravity-FPOM (CoG-FPOM) are proposed.

An extremely important work by Prause (2019) is linked with assessing the risks introduced by realization of different projects of green jobs separately and prospects of green shipping as a whole. There was presented an in-depth analysis of this set of problems for the Baltic region. Another scientific paper (Ragusa, Crampton, 2020) discusses the experience of cooperation between the New South Wales Government and all stakeholders in the matters of environmental pollution in the framework of the "Clean Air" project. The study shows that there is a significant inconsistency in the rules and regulations on pollution of the government and enterprises of different industries, in which sea transport has a special place. This paper proposes the ways to reform existing approaches to providing clean air for each citizen.

There are considered the ways of re-equipping ships or building new ones (Schinas & Metzger, 2019) within the framework of the green shipping paradigm to achieve the goals of the International Maritime Organization (among which: increasing the efficiency and safety of sea transportation by introducing modern eco-friendly

technologies at vessels, decreasing of CO2 footprint etc.). Besides, the economic effect of mounting various kinds of green technologies on ships is analysed: eco-friendly vessels (Taehee & Hyunjeong, 2017), as well as infrastructure for the shipping organization are described. A review of the approaches to understanding the eco-friendly ships in different countries is given; also, a historical outline of the International Maritime Organization requirements and their diversification within the concept of green navigation are presented. There are discussed different scenarios and decision-making approaches (Vakili et al., 2020) in the framework of finding a reasonable balance between pollution caused by ships and their economic efficiency. Besides, the article focuses on noise pollution of shipping routes, which can have no less and, sometimes, even more severe negative consequences for marine ecosystems.

The influence of sea transport on air pollution and the hydrosphere in the Mediterranean region (Viana et al., 2020) is considered. The main threats posed by sea transport for this region's development in terms of environmental impact are studied. The negative effects of sea transport on bird populations are investigated (Wiese & Ryan, 2003). The volumes of fuels and lubricants that are annually sorbed by coastal birds' feathers are analysed. It is concluded that oil pollution of Newfoundland ecosystems occurs year-round, based on the fact that seabirds are polluted by emissions products, regardless of season, hunting, etc.

An in-depth list of those technologies that are now considered part of the green shipping paradigm and eco-friendly ships is presented in the article by Yildirim (2020), with an explanation of how these technologies can have a positive effect on the ecosystem of the seas and oceans. In-depth studies in the field of green shipping (Shi et al., 2018) have shown that technological research needs to be specially strengthened.

3. Research Objective and Methodology

The purpose of this article is to substantiate promising areas of investment in "green shipping" projects under conditions of the COVID-19 pandemic, as well as to review the instruments for increasing the biological safety of vessels in order to ensure the financial stability of shipment companies.

This research is informed by major publications on "green shipping" and sustainable development, publications of analysts linked with the problem of COVID-19 as well as the situation with passenger and military vessels engaged into the problems of the pandemic.

The following methods were applied in the research. In determining the essence of the "green shipping" concept, as well as its fundamental components, the methods of scientific abstraction, logical generalization, induction and deduction, as well persuasive methods were used. The article analyses the primary literature on the research topic to obtain results.

While forming blocks within the updated concept of "green shipping", the logical-structural analysis was used. Besides, the authors performed a qualitative analysis of the green shipping risks and concluded that threats to biological safety had increased dramatically. This allowed adding a biological safety block (or friendly to humanity) to the fundamental components of the "green shipping" concept. In the opinion of the authors, such changes should be made based on the additional analysis of the whole concept of sustainable development. As a hypothesis, conducting similar studies should lead to identifying an essentially new component of sustainable development in general, resulting from the impact of the COVID-19 pandemic.

When selecting the main steps of the primary unit in the "green shipping" system, the system-structural analysis was used. These steps should not be understood as those that must be performed strictly in the specified sequence. There is proposed a ranking of the actions based on a potential country that has significant problems with ensuring the concept of "green shipping" in general, and the biological safety of vessels, in particular. Each

country has its problems to be solved. This means that the priority of these steps depends on the level at which the government and the logistics business in each specific country consider the problems linked with the safety of shipment for the environment and humanity.

This research used the methods of analysis and synthesis, when selecting the instruments, investment in which will allow achieving a high level of biological protection, which will enable the shipping to remain safe and maintain its financial stability even under conditions of such a force majeure event as the COVID-19 pandemic. In particular, the authors studied technologies used in other spheres (applied physics, hydraulics, hydrodynamics) and analysed the possibility of their use for developing "green shipping". The state-of-the-art existing and promising technologies are shown.

4. Results and Discussion

4.1. The COVID-19-Caused Update of the Fundamentals of "Green Shipping" Concept

Sea transportation development dates back to centuries ago. During all this long period, it is impossible to estimate the total tonnage of cargoes delivered, as well as the number of people who reached their destinations. Today it is impossible to imagine Transatlantic route and the horizon of New Hope Cape without Sub-Panamax Class, Panamax Class or even Post-Triple E-Class container ship of 21000 TEU and thousands of enterprises depended on their work efficiency.

At the same time, intensification of shipping has brought an unexpected problem – a negative influence on the environment. According to the most general calculations, transportation is responsible for more than 2.5% of CO_2 emission coming from using energy, creates more than 260 tons of plastic garbage as well as of liquid wastes, which cannot be counted and which destructively influence ecosystems and species (Bhattar, 2019). The tragedy that happened with the Exxon Valdez tanker on 24 March 1989, when, according to different calculations, from 250 to 750 barrels of crude oil were spilt onto the Alaskan's shore, attracted close attention to the future of the shipping industry and shipbuilding in general. Such negative examples when shipment had such a horrible influence on the environment were the basis for designing a new concept – so-called "green shipping". This is why the most general understanding of "green shipping" assumes using the resources and energy by vessels in the way that prevents pollutions made by them as well as reduces the shipping impact on the global environment (Viana et al., 2020).

This concept became a huge leap of industry and one of the essential elements of corporate social responsibility bringing the corporate sector new opportunities – participation in a real green supplying chain (Atari et al., 2019).

As it was mentioned before, the concept of "green shipping" unites the following fundamental components (Fonseca et al., 2020):

- economic – "green shipping" must both be profitable and guarantee the expanded reproduction;
- social – "green shipping" must be a powerful facility to create working places, must provide equal accesses to business opportunities, as well as recreation and cultural opportunities for all people, which use shipment services directly or indirectly;
- environmental – all previously mentioned challenges must lead to the reduction of its impact on climate, ecosystems, nearshore territories to prevent its decisive contribution to global problems' deepening.

From this standpoint, we believe that the concept of "green shipping" is very similar to the most significant paradigm of the 21st century, proclaimed by the General Assembly of United Nations, – sustainable development. In our opinion, the concept of "green shipping" may be realized by introducing of the following tools (Table 1).

Table 1. The Instruments to Achieve the Concept of "Green Shipping" (the most innovative, in the authors' opinion, tools to be implemented as the part of "green shipping" concept are marked blue)

N	Measure	Explanation
1.	**Ballast-Free System**	research and development of new technologies to abandon liquid ballast in future to stabilize the ship and to set up its optimal draft.
2.	**Rebuild Existing and Design New Types of Ship Engines**	which can consume both low-sulphur fuel and liquefied natural gas (LNG) to reduce the air pollution with exhaust fuel. According to scientific estimates, using LNG will stimulate reducing carbon dioxide emissions by 19-24% with simultaneous declining of curb nitrogen oxide emissions by 85-95%.
3.	**Slow-Down the Delivery**	the overall intention to shorten the time of delivery brings overconsumption of high-sulphur fuel oil (HSFO), and indeed causes the air pollution made while shipping the cargo and especially passengers. The estimations described that an insignificant slow-down of ship's movement can consume more than twice less of HSFO than the maximum speed.
4.	**Using New Types of Propulsion**	More effective types of propulsions can increase the efficiency of engines, cut fuel consumption and, possibly, decrease the physical influence on the ocean's ecosystems. That means using and converting ships (from classical propellers) under azipods or water cannons (which previously could only be used on small vessels). The idea of these propulsions is not new by itself; however, they have not become widespread yet; at the same time they can save fuel during manoeuvring near the piers and in the open sea, reduce negative influence on the environment and people's health.
5.	**Using Antifouling Hull Paint**	Fouling on the ship's hull, as practice shows, influences its speed and fuel consumption negatively. Such specific ship hull coating reduces the tempus of organism's growth on it and helps to save up to 5-10% of fuel.
6.	**Heat Utilization**	Outdated technologies used earlier created a surplus heat. Modern technologies of heat utilization using heat exchangers bring opportunities to send such heat to boil water, to make steam and perform comfortable temperature in cabins and cargo areas or other technological needs.
7.	**Use Alternative Sources to Get Movement**	While wind generators are considered today as prospect source of free, ecologically-friendly energy, using sails as propulsion for the vessels becomes less popular; still, this way to transform wind energy into movement represents the almost infinite stock of useful progress, is very cheap and has virtually unlimited potential to implement. It does not mean that all commercial cargo ships or passenger liners must be re-equipped with sails; in this case, it is reasonable to install the wind propulsions only where it is possible from economic, maybe aesthetic, but mostly ecologic reasons.
8.	**Installing Exhaust Gas Recirculation Systems**	This technology allows making partial filtering of exhaust air and to use it twice or thrice in cylinders of a board engine. Besides, this approach decreases the nitrogen pollution of environment.
9.	**Introducing Supercavitation Systems**	Supercavitation is not a new, but, at the same time, not very popular technology due to impossibility to implement it on civil vessels a few decades ago. This technology is characterized with making a big air bubble around the hull of the ship, which creates the area of sparse environment and the boat is sailing partially in air conditions. This technology not only minimizes the friction force among the steel and water but also saves fuel and allows increasing the speed of a ship without any increase in fuel consumption. However, this technology is pretty expensive, requires a lot of R&D, is very complicated to implement and, which is more important, cannot guarantee the stability of such equipment set on board. At the same time, this principle is researched and has a big potential to be used in future.
10.	**Implementation of a Shipment Version of Car Euro Standards**	Starting from Euro 5 standard, all exhaust gas produced by car's diesel engines must be cleaned up by specific chemical - AdBlue liquid. Without any debates, this increases transportation cost; however, it really helps to make movement based on burning diesel fuel more ecologically friendly.
11.	**Partial or Complete Transition to Electricity-Powered Vessels**	The hull of modern commercial vessels, especially over the waterline, may represent dangerous squares to set the solar panels on it. Moreover, the desks, the walls even the glasses may include elements sensitive to sunlight. Thus, the ship becomes a significant generator of electricity. This electricity may be used to supply power to support electric motors. Thus, sailing during the day under direct sunlight may become extremely ecologically friendly and will provide serious economic effect.

Source: (Lauer et al., 2007; Metzger, 2009; Lindstad, 2015; Taehee & Hyunjeong, 2017; Furmaniak et al, 2019; Metzger & Schinas, 2019; Olaniyi et al, 2019; Prause et al., 2019; German airline, 2020; Miśkiewicz & Wolniak, 2020; Yildirim, 2020).
Lines 9, 10, and 11 are the authors' suggestions.

Approaches listed earlier can not only be used with the reason to make shipping friendlier for the environment. This only means that the human notions, full scientific and technological potential, principally other financial opportunities must be oriented on revolutionizing of shipping. That is why we believe that the "green shipping" concept is not only the list of goals, reasons and practical instruments but new economic philosophy which stimulates satisfaction of our increasing needs with simultaneous relief of environmental impact on the marine and air ecosystem.

The modern "green shipping" concept presumes unlimited opportunities in using various technological decisions, which can be realized based on economic, social and ecologic reasons. However, in our opinion, this system of relationships was oriented to reach such efficiency of shipping that allows protecting rights and interests of both current and future generations. Based on this standpoint, we concluded that the "green shipping" concept was a part of a higher-level concept – the concept of sustainable development (Ragusa, 2020).

The pandemic of COVID-19 highlighted a significant problem that modern society is still not ready to protect fully the rights of future generations. Unfortunately, humanity is still to solve another kind of a problem – protection of ourselves.

Gradual internationalization and globalization of humanity have created opportunities for the majority of people to make business and touristic trips on board a ship as well as to intensify the cargo turnover. Each year, the economic role of shipping increases, and during past years, commercial vessels services have accounted for more than 60% of international trade (Viana et al., 2020).

However, along with moving commodities to meet our needs, sea transport brought new dangers – a possibility to spread terrible viruses, like COVID-19. No matter what the shipping purpose is, – be it a passenger liner, commercial cargo or even military vessel – a ship is a closed space, and, hence, favourable for virus replication - just a few examples (see Figure 1).

Military vessels

1. USS Kidd destroyer with a crew of about 330 people, with about 20 sailors infected with the coronavirus.
2. Aircraft carrier US Theodore Roosevelt with a crew of 4000 people. The captain of the ship requested the possibility of isolation for the entire crew when it turned out that there were about 100 people infected on board.
3. According to open sources, the quantity of US Navy ships where infected sailors were discovered reached 25.

Passenger vessels

1. Diamond Princess Cruise Ship with about 4061 (passengers and crew) people on board – residents of 50 countries. By the end of February, a number of infected people reached 705.
2. Grand Princess Cruise Ship with about 3500 (2400 passengers and 1100 crew) people on board – residents of 54 countries. By the end of February, a number of infected people reached more than 130.
3. Ruby Princess Cruise Ship – 662 people infected, Greg Mortimer Cruise Ship – 128 people infected; Horizon Cruise Ship – 125 people infected; Grand Princess Cruise Ship – 103 people infected.

Figure 1. Some Examples of Ships with COVID-19 Diagnosed in People on Board
Source: The authors' research based on the data from Open Internet mass-media sources.

Just taking these data, it is easy to conclude that by the time when the first infected people were discovered, the total share of sick people on board has already amounted to 2.5-15%, and there is no guarantee that by this time some percentage of infected people have not returned to their native countries. The model of a virus further transmission (no mater of a kind: COVID-19, bird or swine flu) by the people who sailed on the ships or just communicated with infected passengers after their return can be built only with enormous approximations, which makes this model meaningless. Moreover, the disease can go on with and without symptoms. And there is no certainty that all potential COVID-19 carriers from these and other ships were detected on time and whether they were detected at all.

At the same time, there was also another situation where the Magnifica cruise liner became a shelter for 3,000 passengers who were afraid to go ashore and felt completely safe on board since there was no coronavirus there. It is an exception, of course, but it is an example when the ship becomes like a "doomsday shelter" – the shelter only for those people who are already on board.

This problem sharpens the concept of "green shipping", according to which today the vessels must be reviewed not only from their eco-friendly status for the environment, but also as a safe place for people's health and life (Schinas, 2019).

Different instruments can help reach this horizon. Their implementation will create strategic advantages for shipping, among which are (see Figure 2):
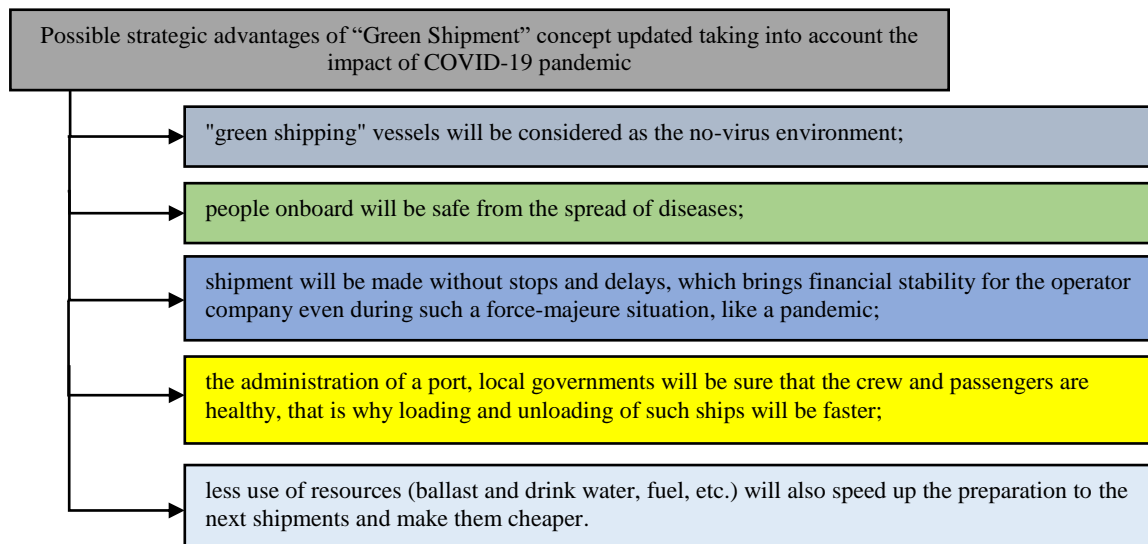
Figure 2. Advantages of the Updated Concept of "Green Shipping"

Source: developed by the authors.

Obviously, these initiatives require serious financing. That is why shipment companies along with international organizations, governments and shipbuilding companies must be ready to attract and accumulate significant investments (private, governmental, from international financial organizations) in order to ensure new norms of safety on vessels according to the updated "green shipping" concept, organize the powerful international team for doing R&D oriented to new technician conditions. Only such incentives, in our opinion, provide tangible results (Wiese & Ryan, 2003).

Thus, according to previously generated opinions, we believe that the "green shipping" concept, along with the fundamental components of sustainable development, must include another one – friendliness to humanity (Figure 3).
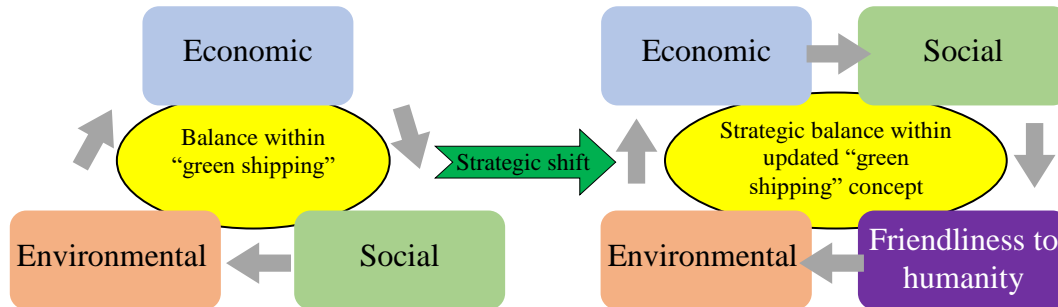
Figure 3. The author's approach to understanding the fundamental components of the updated "green shipping" concept, resulting from COVID-19 pandemic influence

Source: The authors' research, according to (Fonseca et al., 2020).
The block "Friendliness to humanity" is the authors' research.

In the opinion of the authors, given the COVID-19 pandemic influence, the 17 Sustainable Development Goals, approved in 2015 by the UN General Assembly, should also be expanded correspondingly.

4.2. The International Investments into "Green Shipment" under the Impact of COVID-19

First of all, we must research a new approach to understanding the essence of the "green shipping" concept. We believe that the renewed concept must not only be oriented on minimizing the negative effect of shipment business on the environment but also be formulated taking into account the impact of unexpected, force-majeure circumstance on the wellness of humanity (Ragusa & Crampton, 2020).

Based on this standpoint we suggest understanding the concept of "green shipping" as a fundamental model of growth and development within the shipment business that is oriented on protecting health, life and rights of humanity as well as using the resources and energy by different types of both cargo and passenger vessels connected with preventing pollution made by ships as well as reducing shipping impact on global environment (Prokopenko O. et al., 2020).

As we have already mentioned, the instruments that have been already successfully implemented in the frames of "green shipping" and which are the parts of the second block, further will be oriented on the investments to create and support an organization of the primary block.

According to our approach, the "green shipping" concept has two fundamental blocks (Table 2).

Table 2. Basic blocks of the updated concept of "green shipping"

Block	Explanation
Primary block	Protection of human rights. This means that vessels, no matter of their subordination and purpose, must be "human-friendly". Operator companies, governments, and international institutions must introduce all the necessary levers to protect the health and safety of people onboard and avoid the spreading of the biologic hazard from the board of a ship (diseases, viruses, insects, rodents etc.) to maintain the regular regime of life and protect from negative (destructive) consequences the national economy as well as national security.
Secondary block	Implementation of all possible instruments and technologies to reduce the burden on the environment, ecosystems, flora and fauna, to protect the right of future generations to live in the same (or better) conditions as (or than) the current generation. This block unites all previously existing approaches to understand this concept.

Source: The authors' research.

The most important directions which require a severe accumulation of international investments to attain all goals from the primary block are as follows (ranged by the rate of importance) (see Figure 4).
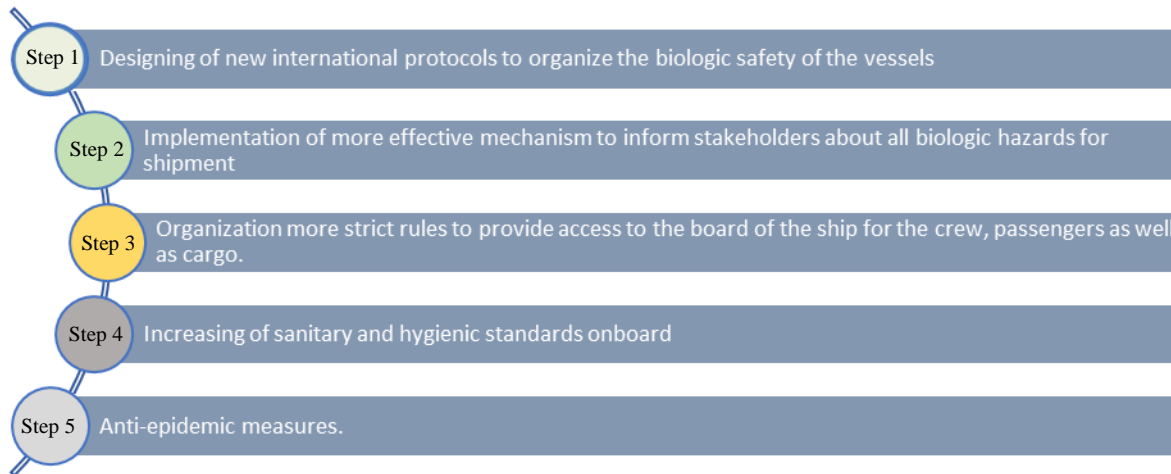
Figure 4. The Step-By-Step Mechanism to Implement the Primary Block of the Updated "Green Shipping" Concept

Source: developed by the authors.

We will describe those steps more precisely:

Step 1. Designing and implementing new international protocols to organize the biologic safety of the vessels independently of their conformation or inconsistency with classical postulates of "green shipping" concepts. Such contracts are to regulate the behaviour and interaction of all stakeholders engaged into a shipment process (from the port administration, port stevedores and loaders to vessels' crews and passengers) to provide the maximum level of their biologic safety. Another task to be solved within these protocols is a step-by-step plan to preventive diagnosing of possible biologic hazards coming from the boards of the ships as well as participants' actions if such a dangerous situation happens.

Step 2. Implementing a more effective mechanism to inform operator companies, logistic agencies and governments about all biologic hazards for shipment as well as about the choice of methods to avoid the penetration of these hazards onboard. This step means the necessity to design a global information system which will inform all kinds of stakeholders about the existing biologic dangers: within the mother country for both vessel and all crew members; within the destination country for cargo or/and passengers. All stakeholders

accredited to make shipment must obligatory be the members of this system and permanently monitor it according to the protocols reviewed in step 1. We propose to name this system the "Global Ship Information System on Biological Safety" (GSISOBS).

Step 3. Establishing stricter rules to provide access on board a ship for the crew, passengers and cargo. All people before the sea voyage must be monitored according to medical standards taking into account information from GSISOBS (step 2).

Step 4. Increasing sanitary and hygienic standards onboard (based on step 3):

● Daily express-monitoring the health status of the people on board;
● Making at least selective blood examination if the term of a sea voyage exceeds 5 days (every 5 days). The model of COVID-19 spread showed the virus incubation time of 4-5 days.
● Allocating mandatorily individual cabins with the highest level of biological protection for 2-3 patients. This must include all necessary infrastructure and tools for ship medical staff.
● Introducing a closed-cycle filtering and disinfection of ballast, technical wastewaters only using onboard equipment.
● Ensuring opportunities for primary sanitary treatment of a vessel in case pathogen is detected.

Step 5. Anti-epidemic measures. If stakeholders' efforts have not yielded results in the previous 4 steps, the highest-level protocol should be applied, involving the local government, medical services and (if necessary) international organizations in solving the problem. Information should be instantly placed in the system GSISOBS. The tools within this protocol may include isolation, quarantine for a crew and passengers, etc.

We understand the value of financial resources necessary to implement at least few of these steps; however, it is evident that an inevitable loss of profitability due to the reduction in the useful area of ships, introduction of complex (and expensive) onboard systems for monitoring, medical examination, laboratory tests, as well as disinfection, hiring and remuneration of trained personnel, possible delays cannot be compared with economic losses due to complete stop of production, and, hence, the sea delivery of goods and passengers.

We can take the case of Deutsche Lufthansa AG as an example. According to Carsten Spohr, the CEO of this airline, company loses €1 mln each hour (German airline, 2020). Of course, the airline is not a spaceship-operator company; however, we believe that losses there are even heavier taking into account the cost of infrastructure, vessels, expenditures for their support and the quantity of people engaged as well as third-side stakeholders.

Therefore, we believe that the above steps, although complicated and expensive to carry out, in a strategic perspective can ensure the financial stability of the companies/ship operators and make the ships genuinely consistent with the concept of "green shipments" – friendly with humanity an environment. In the end, COVID-19 pandemic shows that if our forces are not directed to protect people living today, there will be no future generations and the profitability of shipment business becomes the least problem for the future.

At the same time, we believe that it is not right to fight only those threats that result or may result from "green shipping". The problem of the COVID-19 spread showed that the solutions for dealing with global threats to biological safety must be searched in a complex. Moreover, the spread of this virus has shown that there is no global system of preventive measures that could effectively counter such threats. All, even the most modern, measures of protection and confrontation (AI tool, 2020; Leichman, 2020; Meisenzahl, 2020 and others) are only reactive, that is, those that are implemented only when the problem is already real and the mechanism of its aggravation has already been launched.

The problem is further aggravated by the fact that no one knows or can say what other problems we may face in the future. This is confirmed by the rate of incidence of COVID-19, which, in reality, no one expected.

From this perspective, we propose three measures, which should be aimed at combating potential threats and creating a mechanism for the first estimation of potential threats (Table 3). As we can see, such measures' implementation is a rather costly process, but nevertheless it is extremely important, since this is the only way for scientists to receive sufficient funding to conduct research with the aim of an early detection of corporate, national, regional, and global problems. It is important to add here that projects that are realizable within the framework of these measures may be: "green shipping", "green energy", "environmentally friendly production", "alternative fuel", "socially responsible business", in a word, everything that, in one way or another, is related to any type of activity, including the safety of maritime transport.

Table 3. The System of Measures to Create a Mechanism of estimating and preventing potential national, interstate and global threats

N.	Measure	Aims	Comment
1.	To form interdisciplinary groups of scientists at: International organizations (the UN, WHO, IMF, World Bank, International Maritime Organization, as well as all specialized organizations); at regional associations, free trade zones, trade associations.	1. to preventively estimate potential threats and risks for the global and regional economic systems; 2. to form strategies and recommendations for a effective beforehand response to these threats; 3. to distribute financial resources for scientific research between the priority sectors of science; 4. to evaluate the effectiveness of previous actions at global and regional levels.	Such groups of scientists should have at their disposal all means available to estimate potential threats: statistics, computing power, financial resources, as well as unlimited access to academic mobility. The main basis behind such a measure is a preventive nature. All their actions should be aimed at a timely estimation of threats and at designing effective mechanisms to minimize them. Such threats may include: potential distribution of diseases (threat of epidemics, pandemics); economic and financial crises; trade barriers, protectionism; protection of human rights etc.
2.	To form interdisciplinary groups of scientists at transnational corporations to prevent the harmful effects of companies on people, ecosystems, the climate in general and to prevent such an impact on the company itself.	1. to estimate potential threats and risks for the corporate activity; 2. to estimate the role and contribution of TNCs in deepening this threat; 3. to design tools to counter the aggravation of such threats; 4. to research perspective areas for the quality development of companies.	The corporate sector must realize that ill, unhappy, poor etc. employees cannot create additional value. Moreover ill, unhappy, poor etc. clients (consumers, customers) cannot bring economic effect or may be the source of biological hazard for the company itself. It is extremely important for the updated concept of "green shipping" – safety and economic efficiency of ports, sea terminals, and vessels. Funding for such groups of scientists should come from the company's net profit in the amounts set by groups of scientists at the international organizations and should not be abolished by the general meeting of shareholders.
3.	To establish an independent interdisciplinary fund of scientific grants to finance research and development in the field of national (biological, economic, financial, environmental, social) security at the government.	1. to do strategic estimate of sources of threats to the national security; 2. to ensure the ability to quickly form working groups of scientists to develop a set of measures to counter specific threats; 3. to prioritize research funding.	An independent foundation should be subordinate only to the head of the country and act only in the national interests. With the help of such a fund, operational funding (without bureaucratic barriers) can be received by those developments, the implementation of which would be too long without this fund or would not make sense in situations where the problem is already real, but the timely implementation of which should minimize or prevent the threat. Funding for such a foundation should come from the state budget and voluntary corporate investments. As business becomes more socially responsible, investing in such a fund is one of the most effective ways to deal with common problems for the whole country.

Source: developed by the authors.

Conclusions

Summing up, it should be stated that the concept of "green shipping" is more relevant than ever. It proves that shipments are the driving forces of our progress, that without them the normal lives of ordinary people, as well as national economies and business development, are impossible. At the same time, ships can and do pose a threat to the environment, ecosystems and living organisms. Introduction of several measures (sometimes costly) can make existing and new ships more environmentally friendly, which will be useful both for the benefit of humanity, protection of the nature, and development of business itself, as the latest energy-saving technologies increase the efficiency when using resources, energy and fuel. This provides tangible savings, which is a tactical and strategic perspective guaranteeing not only shipping profitability but also financial stability for those companies that invest in such technologies regardless of the situation in the world.

The COVID-19 pandemic revealed yet another feature of the "green shipping" concept. Today, it is no longer enough just to ensure the environmental safety of ships, but also to implement appropriate measures to ensure biological security for the crew, passengers and cargo. Only the most abundant calculations based on information from open sources give reason to believe that at the time when the pathogenic organism is diagnosed in the first patient, 2.5-15% of people on board are already infected. This is a huge figure which suggests that any epidemic coming from the ship can spread very quickly in the country where passengers land or commodities are discharged.

This situation requires implementing serious measures to improve the biological protection for people on board ships and port workers. Such measures should include both developing appropriate protocols and financing specific equipment installation. Besides, the protocols should presume behaviour and relationship of the stakeholders involved in maritime trade and passenger traffic.

Such investments involve a wide range of stakeholders: ship operating companies, logistics agencies, representatives of ports, governments, as well as international organizations. Besides, this is a serious financial investment which in the operational future may lead to a specific decrease in profitability. However, such steps, in our opinion, are more acceptable than a complete shutdown of production, and therefore shipping, due to the spread of biological hazards.

The article covers the essence of the concept of "green shipping" and explains why this concept should be updated. For this purpose:

- a new understanding of the "green shipping" concept was formed;
- the connection between "green shipping" and the concept of sustainable development was substantiated, the influence of one concept on another was explained;
- the concept of "green shipping" was divided into two fundamental blocks and proposed tools, by implementing which it is possible to achieve the goals set in these blocks;
- within the framework of technological solutions, there were offered the newest means of "green shipping": introducing supercavitation systems, implementing a shipment version of car Euro standards, a partial or complete transition to electric-powered vessels;
- there was identified a new component that should enter into a single system with an economic, social, and environmental component - the element of friendliness to humanity.

References

AI tool which analysed COVID-19 in Wuhan available to NHS. (2020). *Med-Tech News*. https://www.med-technews.com/news/ai-tool-which-analysed-covid-19-in-wuhan-available-to-nhs/

Atari, S.; Bakkar, Y.; Olaniyi, EO; & Prause, G. (2019). Real Options Analysis of Abatement Investments for Sulphur Emission Control Areas Compliance. *Entrepreneurship and Sustainability Issues* 6 (3): 1062-1087. https://doi.org/10.9770/jesi.2019.6.3(1)

Bashynska, I.; & Dyskina, A. (2018). The Overview-Analytical Document of the International Experience of Building Smart City. *Business: Theory and Practice* 19: 228–241. https://doi.org/10.3846/btp.2018.23

Bhattar, Payal. (2019). Green Shipping is the New Gold. Wärtsilä. 2 July. https://www.wartsila.com/twentyfour7/environment/green-shipping-is-the-new-gold

Fonseca, L.M.; Domingues, P.; & Dima, A.M. (2020). Mapping the Sustainable Development Goals Relationships, *Sustainability (Switzerland)*, 12 (8), Article number 3359. https://doi.org/10.3390/SU12083359

Furmaniak, S. et al. (2019). The effects of confinement in pores built of folded graphene sheets on the equilibrium of nitrogen monoxide dimerisation reaction. *Journal of Physics Condensed Matter* 31(13): 1-12. https://doi.org/10.1088/1361-648X/aaffb3

German Airline Giant Lufthansa 'losing €1 Million Per Hour. (2020). The local.de. 9 April 2020. https://www.thelocal.de/20200409/german-airline-giant-lufthansa-losing-1-million-per-hour

Kitzmann, H; Falko, S.; Prause, G. (2020). Risk Assessment of Logistics Hub Development Along Green Transport Corridors: The Case of Paldiski Port, *Lecture Notes in Networks and Systems* 117: 341-350. https://link.springer.com/chapter/10.1007/978-3-030-44610-9_34

Lauer, A.; Eyring, V.; Hendricks, J.; Jöckel, P.; & Lohmann, U. (2007). Global Model Simulations of the Impact of Ocean-Going Ships on Aerosols, Clouds, and the Radiation Budget. *Atmospheric Chemistry and Physics* 7 (19): 5061-5079. https://doi.org/10.5194/acp-7-5061-2007

Leichman, A.K. (2020). 30 Israeli medical innovations to fight coronavirus. https://www.israel21c.org/30-israeli-medical-tech-solutions-to-help-fight-coronavirus/

Lindstad, H.; Eskeland, G.S.; Psaraftis, H.; Sandaas, I.; & Strømman, A.H. (2015). Maritime Shipping and Emissions: A Three-Layered, Damage-Based Approach. *Ocean Engineering* 110: 94-101. https://doi.org/10.1016/j.oceaneng.2015.09.029

Meisenzahl, Mary. (2020). The company behind the robot kicked out of a New York park has a new version that it says can screen people for COVID-19. https://www.businessinsider.com/temperature-screening-robot-can-be-used-as-coronavirus-security-2020-4

Metzger, D.; & Schinas, O. (2019). Fuzzy Real Options and Shared Savings: Investment Appraisal for Green Shipping Technologies. *Transportation Research. Part D: Transport and Environment* 77: 1-10. https://doi.org/10.1016/j.trd.2019.09.016

Miśkiewicz, R, & Wolniak, R. (2020). Practical Application of the Industry 4.0 Concept in a Steel Company. *Sustainability* 12(14): 5776. https://doi.org/10.3390/su12145776

Olaniyi, E. O.; Bakkar, Y.; & Prause, G. (2019). Entrepreneurial Compliance Opportunities for Maritime Fuel Producers, *Entrepreneurship and Sustainability Issues,* 6(4): 1550-1565. https://doi.org/10.9770/jesi.2019.6.4(1)

Prause, G.; Reinhold, K.; Järvis, M.; Olaniyi, E.; & Tint, P. (2019). The Socio-Economic Impact of Green Shipping: A Holistic View from the Baltic Sea Region. *Lecture Notes in Networks and Systems* 68: 615-624. https://doi.org/10.1007/978-3-030-12450-2_59

Prokopenko, O.V. (2011). Consumer Choice Types in Marketing of Ecological Innovations, *Actual Problems of Economics*, 16(2), pp. 109-116.

Prokopenko O. et al. (2020). Adaptation of the Development of Ecological Entrepreneurship, *International Journal of Scientific and Technology Research* 9(3): 1112-1115. http://www.ijstr.org/final-print/mar2020/Adaptation-Of-The-Development-Of-Ecological-Entrepreneurship.pdf

Ragusa, A.T.; & Crampton, A. (2020). Cruising for Better Air Quality: Australian Clean Air Submissions, Issues, and Recommendations. 7th International Conference on Environment Pollution and Prevention, ICEPP 2019; Melbourne; Australia; 158: Article number 2003. https://doi.org/10.1051/e3sconf/202015802003

Schinas, O.; & Metzger, D. (2019). A Pay-As-You-Save Model for the Promotion of Greening Technologies in Shipping. *Transportation Research. Part D: Transport and Environment* 69: 184-195. https://doi.org/10.1016/j.trd.2019.01.018

Shi, W., Xiao, Y., Chen, Z., McLaughlin, H., & Li, K. X. (2018). Evolution of Green Shipping Research: Themes and Methods. *Maritime Policy & Management* 1–14. https://doi.org/10.1080/03088839.2018.1489150

Statista. (2019) Number of Ocean Cruise Passengers Worldwide from 2009 to 2020. https://www.statista.com/statistics/385445/number-of-passengers-of-the-cruise-industry-worldwide

Taehee, Lee; & Hyunjeong, Nam. (2017). A Study on Green Shipping in Major Countries: In the View of Shipyards, Shipping Companies, Ports, and Policies. *The Asian Journal of Shipping and Logistics* 33(4): 253-262. https://doi.org/10.1016/j.ajsl.2017.12.009

UNCTAD. (2019) Maritime Transport Indicators. https://stats.unctad.org/handbook/MaritimeTransport/Indicators.html

Vakili, S.; Ölcer, A.I.; & Ballini, F. (2020). The Trade-Off Analysis for the Mitigation of Underwater Noise Pollution from Commercial Vessels: Case Study – Trans Mountain Project, Port of Vancouver, Canada. *Proceedings of the Institution of Mechanical Engineers. Part M: Journal of Engineering for the Maritime Environment* 234(2): 599-617. https://doi.org/10.1177/1475090219886397

Viana, M.; Rizza, V.; Tobías, A.; Carr, E.; Corbett, J.; Sofiev, M.; Karanasiou, A.; Buonanno, G.; & Fann, N. (2020). Estimated health Impacts from Maritime Transport in the Mediterranean Region and Benefits from the Use of Cleaner Fuels. *Environment International*. 138: Article number 105670. https://doi.org/10.1016/j.envint.2020.105670

Wiese, F.K.; & Ryan, P.C. (2003). The Extent of Chronic Marine Oil Pollution in Southeastern Newfoundland Waters Assessed through Beached Bird Surveys 1984-1999. *Marine Pollution Bulletin* 46 (9): 1090-1101. https://doi.org/10.1016/S0025-326X(03)00250-9

Yildirim, Captain Onur. (2020). Green Shipping Technology Changing the Industry. USA, Ohio: Advanced Polymer Coatings. https://www.adv-polymer.com/blog/green-shipping

Olha PROKOPENKO, Doctor of Economics, Professor, Business Administration Department, Tallinn University of Technology, Estonia. Her work was supported by grants, scholarships and awarded with diplomas in Switzerland, Latvia, Slovakia, Ukraine, Bulgaria, Poland and Georgia. She is currently working in some EU projects, including «Clean Shipping Project Platform (CSHIPP)». Research interests: sustainability; entrepreneurship; innovations; digitalization.
ORCID ID: orcid.org/0000-0003-1362-478X

Radosław MIŚKIEWICZ, Ph.D., Habilitated Doctor in Economics, Associate Professor, Faculty of Organization and Management, Silesian University of Technology, Poland. Research interests: energy management; energy security; energy policy; sustainable development; organizational structure; knowledge transfer; knowledge management; Industry 4.0; digitalization.
ORCID ID: orcid.org/0000-0003-2370-4783

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

A NOVEL COMPOSITE INDEX FOR REGIONAL INNOVATION ASSESSMENT WITH AN APPLICATION TO EGYPTIAN GOVERNORATES[*]

Motaz Khorshid [1], Mohamed Ramadan A. Rezk [2], Mohamed Ismail [3], Amr Radwan [4*], Mahmoud M. Sakr [5]

[1,3] *Cairo University, 1 Gamaa Street, 12613 Giza, Egypt*
[2,4,5]*Academy of Scientific Research and Technology (ASRT),101 Elkasr Alini St,11516, Cairo, Egypt*

*E-mails:[1] motaz.khorshid@gmail.com, [2]mramadan79@gmail.com, [3]mismail@feps.edu.eg,
[4*]radwan.amro@gmail.com (Corresponding author), [5]msakr@asrt.sci.eg*

Abstract. Innovation can be classified based on the type of its outcome which includes knowledge and technology, creative and cultural outcomes in addition to intangible assets. Innovation composite index is generally designed with the purpose of estimating the innovation capabilities and competencies of different governorates or regions. In this work, a governorate innovation composite index (GICI) is constructed and applied to the Egyptian governorates to evaluate the efficiency and effectiveness of adopted innovation measures and policies in these regions along with the assessment of the societal impact. Considering standard type of innovation composite indicators, the Egyptian index proposed in this work is conceptually broken down into a set of innovation inputs and outputs composing its production function. Inputs are divided into factors which are used to produce innovation output while considering specific enabling factors. The application of the innovation governorate index to the Egyptian context has delineated general as well as specific results. First, Innovation performance of governorates measured by the value of the composite index, shows a moderate attitude, whereas input sub-pillars for governorates are however on the low side. In light of this finding, Egypt's government needs to consolidate efforts towards enhancing the

---

capacity of innovation inputs. Second, the mean value of the governorates output pillar ranged from 53 to 99 percent. Based on this finding, the Egyptian government needs to adopt an integrated policy package to achieve the balance between input and output parameters of innovation. Finally, this paper suggests that the difference in innovation performance between regions should be considered as an important part in developing national innovation strategies.

Keywords: Innovation production function, composite index, regional innovation; benchmarking; innovation metrics.

1. Introduction

The recent *Oslo Manual* (OECD and Eurostat, 2018), defined innovation as "a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)". This definition also includes the generation of new ideas, as well as the recombination of existing ideas. Given this rationale, the minimum requirements for an innovation must be new (or significantly improved) product, process to the firm (OECD,2018). Other international organisations such as the United Nations Educational, Science and Culture Organization (UNESCO) and the World Intellectual Property Organization (WIPO) have favoured also this definition (UNESCO, 2013).

Innovation drives economic growth, improves welfare of citizens, supports the transformation of countries to the knowledge era and helps to address social challenges (OECD, 2010a, Bassinini et al 2000, Pessoa 2010, OECD 2004 and 2010, EBRD 2019, Khorshid 2018, Khorshid and Ismail 2019). Innovation is considered a key driver to economic growth and competitiveness. Many traditional industrial economies are now in the process of transformation to a knowledge Economy, where innovation is considered one of the mains drivers for the transformation process, as well as a major factor for sustained economic development (Grupp and Mogee, 2004). Furthermore, many countries today are developing national plans in order to enhance their innovative capacity, with an aim to improve the growth prospects of their economies (Porter, 1999). The outcomes of innovation are often measured in terms of creative outputs such as , significant increase in sales from new products, significant reduction of a manufacturing processing time or the frequency of new product launches (Sofka, 2010, Laursen, 2006).

Innovation activities does not occur only in business sector or industrial companies but can also happen in any non-profit organization, cities, governorates, regions and countries at large. International studies show different levels of composite innovation indicators, such as product or process innovation, creative services, marketing and organisational innovation (Radwan and Sakr, 2018). Moreover, innovation generally requires collaboration with different stakeholders for knowledge, technology and risk sharing. An important type of innovation refers to the ability to make major improvements and modifications to existing technologies, or create new technologies (Furman, 2002). Many studies have been trying to measure innovation through creating an innovation complex index. An innovation index is a concise quantitative measure of the innovative capability of institutions, businesses or countries (Aspen Institute Italia 2007).

Moreover, composite innovation index represents a tool to measure, monitor and promote progress of the innovation performance in a company, region or country. The index could also serve as a quantitative benchmark highlighting the interaction between inputs and outputs of innovation and could help to assess policy means needed to boost innovation, to achieve economic growth and create new jobs. Furthermore, composite innovation index highlights policy challenges, and support the development of policies to draft new national innovation strategies (Jarunee, 2010).

On other front, innovation statistics can be used to evaluate the effectiveness of government public science and technology policies, and to compare the position of countries regarding innovation performance. Recently, several studies have developed composite innovation indices over the years to assess countries' positions and to evaluate the effectiveness of governments' interventions regarding innovation policies and strategies (Mahroum & Al-Saleh, 2013). Thus, several international institutions developed a range of innovation indices, (the European Innovation Scoreboard, the National Innovative Capacity Index from the World Economic Forum, the UNCTAD's indices, the Innovation Index of the World Bank, the Nordic Innovation Monitor, the OECD Science, Technology and Industry scoreboard, the Bloomberg Innovation Index, and the global innovation index or GII (Mahroum & Al-Saleh, 2013).

The analysis of composite indices helps policymakers and governments throughout the world to identify paths for future design and development of innovation policies. Based on recent literature, innovation is measured at different levels, starting from the level of a world geographic region, a country, a locality, a city or a company. In the recent years, we can find many studies aimed at measuring innovation at the city level, (Ergasakis et al., 2004), and others have developed specific metrics and indicators to provide a comparative assessment of the innovation performance of nations and regions (Dvir and Pasher, 2004; Metaxiotis et al., 2006; Scheel, 2011).

The purposes of this paper are; (i) to identify and articulate the linkages between innovation, research and development (R&D), science and technology strategies and economic development, (ii) to develop the multidimensional conceptual model of innovation, (iii) to assess alternative approaches to construct a composite innovation index, (iv) to develop a conceptual model for estimating a governorate innovation composite index (GICI) and (v) to use this model to estimate a composite index along with its inputs and outputs for the Egyptian governorates, and finally, (vi) to assess the innovation efficiency, effectiveness and impact of Egypt's governorates based on the developed composite index and its pillar, sub-pillars, sub-indicators and variables. Given these analytical objectives, the paper is organized around four sections. The first section summarizes the role of innovation in socioeconomic development, identifies the multi- dimensional structural model of the innovation process, and explains alternative approaches for its estimation and assessment of its impact. Section two develops the conceptual structure of the governorate innovation composite index (GICI), particularly constructed to evaluate innovation inputs and outputs of the Egyptian governorates, and describes as well the methodology used to estimate its pillars, sub-pillars, sub-indicators and Variables. Section three is devoted to the analysis and discussion of the obtained results. Finally, section four includes the concluding remarks and policy recommendation, followed by the list of references.

1.1. Innovation for development

In the Oslo Manual developed by OECD in 2005 and adopted by the UNESCO, innovation is defined as "creative activity leading to the development of new (or significantly improved) products (goods and services), processes, marketing methods and organizational models" (OECD 2005, UNESCO 2017). In the recently developed OSLO manual of 2018, the revised definition states that " innovation is a new product or process which differs significantly from the product previously delivered to consumers or the process previously used by the company

or the industry (OECD and Eurostat 2018). Based on this recent definition, OSLO Manual makes the difference between "Product Innovation" and "Business Process Innovation". Furthermore, based on OSLO Manual, "Innovative Activities" include all Development, organizational, financing and commercialization operations leading to the implementation of product or process innovation. Based on the above rationale, "an innovative company or institution "is a company that produced (or capable of producing) product or process innovation during the last two to three years. It is worth noting that innovation product or process should be implemented and generates societal impact. Product innovation should be used by consumers, and process innovation should be applied by a company or institution. Because innovation generally produces new (or significantly improved) products or processes, with different characteristics and better technical or behavioral features, one would expect that innovation will have an accelerating impact on growth and welfare prospects of the society in general, and the economic system in particular. On the other hand, innovation differs from research and development activities in several ways. First, innovation represents a more advanced level of development compared to research activities. It corresponds to the complete cycle of research that begins with basic and applied research, experimental development, prototyping and modeling, and finally with commercialization and marketing. Innovation can be produced however outside the research institutions based on knowledge worker's advanced skills and competences. As such, innovation generates considerable impact on markets of goods and services, and the value added generated within the production activities. It should be noted finally that innovation represents generally a basic feature of the knowledge Economy and society. Based on the above definitions and rationale, innovation is considered an important factor for transforming countries to a knowledge-based economy and achieving socioeconomic sustainable development. (Radwan 2018; Khorshid 2018; EBRD 2019).

1.2. Multi-dimensional Innovation Model

Given its sizable impact on markets of goods and services, the performance of production activities, and the society at large, innovation can be conceptually represented by a multidimensional model. As shown in figure (1), the studies on innovation as well as approaches for estimating its impact are grouped into three categories or dimensions including; i) sources of producing innovation, ii) innovation domains and iii) classes of innovation Outputs (Khorshid 2019). With respect to the "first category", innovation can be generated (or produced) as part of the research and development activities. In principle, the complete research cycle that begins with examination of natural phenomena, carrying out basic and applied research, undertaking experimental development and designing prototype models, ends generally with new commercialized products or new production processes (as an innovation output). This "first innovation producing model" is generally associated with the construction of advanced or modern R&D Infrastructure such as "science and research parks" and "advanced technology valleys", in order to establish the linkages between university research centers and other knowledge producing unites on one hand, and the demand of industries, services and society at large, on the other hand . This first model satisfies also the 4 P's approach of research and development Outputs (namely, Published Papers, Patents, Prototypes and Products), (Khorshid 2015 a). Another source of producing innovation, is the business sector (or commodity producing companies). The outcome of this production category is generally represented by new or significantly improved goods, services, managerial models or marketing methods. The innovation in production activities is analyzed in detail in OSLO manuals. The estimation of innovation inputs, outputs, and efficiency according to this model, is carried out using community statistical surveys. These surveys are broken down into innovative activities, creative linkages (such as sources of information and institutional cooperation), and financial support, as innovation inputs. Innovation outputs are classified as technological and non-technological innovation products, innovation impact, innovation barriers and intellectual property income, (Hollanders et al 2014, European Commission 2017 and ESTIO 2015).

Finally, innovation can be produced, outside the research centers and the production sphere of the economy. This happens generally with societies characterized by creative, highly skilled and educated labor. This innovation model is named as "societal innovation". As a source of producing innovation, this model demands modern and technology advanced environment which coop with the knowledge era and the fourth industrial revolution of the twenty-one century, highly skilled population, and favorable enabling economic and social environment. (UNDP 2016 2017 and Dutta et al 2014). The societal innovation emerged for the first time, as a source of creative products in developing the global innovation index (produced by the world intellectual property income (WIPO), Cornel University, and INSEAD).
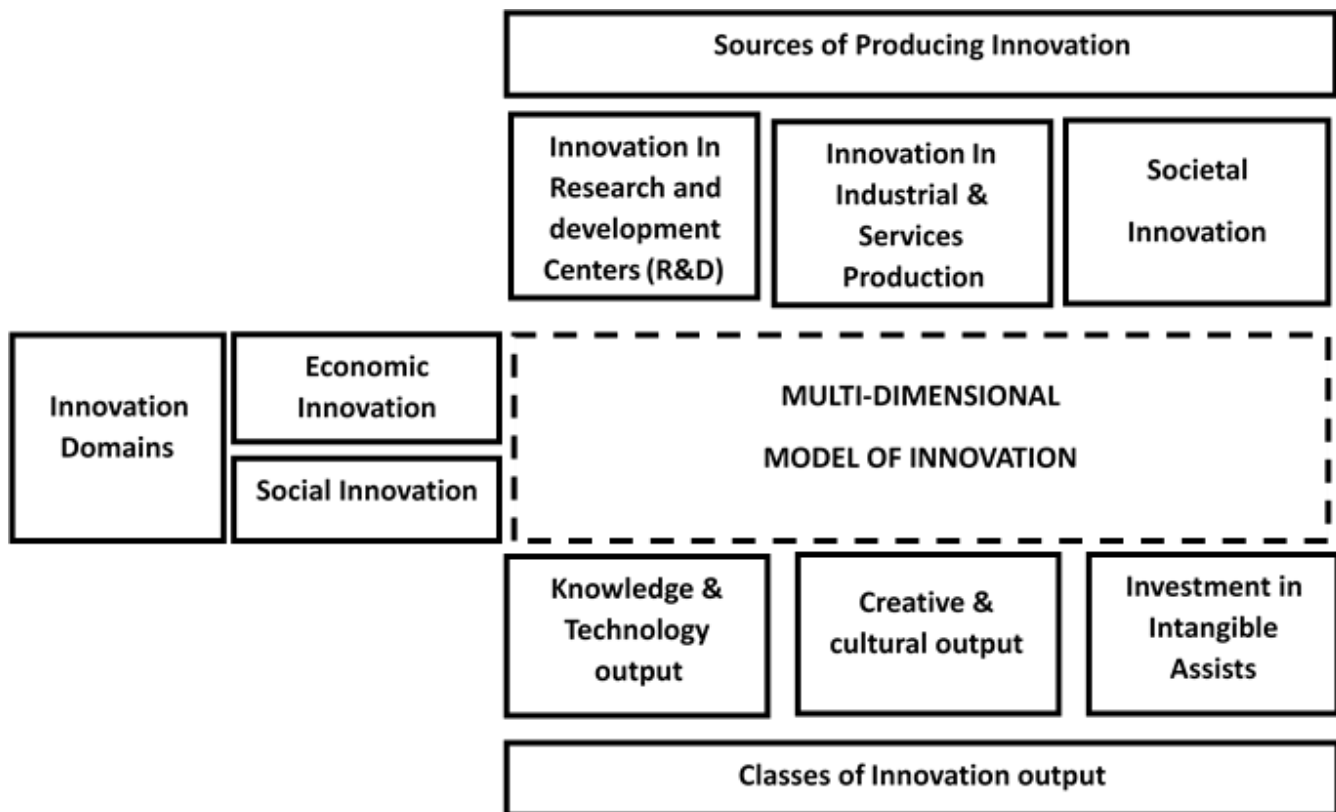
Figure (1). Multi-dimensional Innovation Model

Based on this new concept, Innovation Index should reflect a socioeconomic phenomenon explaining scientific, cultural and education levels of the society at large, including skilled and competent knowledge worker, advanced manufacturing technology, and socioeconomic and institutional infrastructural supporting innovation activities. Based on this specific rationale, R&D indicators represent only one input to innovation that should be complemented by education and human capital, physical and computing infrastructures, efficiency of economic markets, effectiveness of business sector and appropriate institutional system to close the circle of innovation inputs. Based on This new vision, innovation outcomes are generally broken down into knowledge and technology outcomes, creative and cultural outputs and intangible assets (Dutta et al 2014).

As shown in figure (1), innovation can be also classified according to its domain of application. In this respect, innovation in economic or social domain is identified. Social innovation is defined by the World Bank as a creative activity directed to address social challenges that cannot be handled by market economies. Given this rationale, social innovation produces new services with the purpose of significantly improving living standards of citizens, as well as their welfare measures. This type of innovation seeks to adopt appropriate policies leading to the integration of labor markets, the creation of new cognitive skills, and the development of new job opportunities. As such, social innovation addresses mainly the social dimension of innovation. On the other hand, innovation in economic domain aims at creating new or significantly improved marketed goods and services in order to enhance productivity and economic growth prospects. Meanwhile, Economic innovation addresses the creativity of production processes and marketing policies. As such, it is considered the corner stone for accelerating the economic development process of a country (World Bank 2007 a,b).

The third "dimension of innovation" is the nature and character of its outcome and impact. Here, we can identify three categories of outputs, knowledge and technology output, creative and cultural output and investment in intangible assets (Cornell University, INSEAD and WIPO 2018). Knowledge and technology outputs are generally classified into knowledge production, impact of knowledge and knowledge dissemination. Knowledge dissemination is represented in the world wide innovation composite indices by a number of variables such as income from property income, high technology exports, ICT exports and foreign direct investments (FDI), especially those directed to knowledge creation and increasing its stock. On the other hand, knowledge impact is assessed by a set of variables such as labor force productivity, intensity of establishing new business enterprises, spending on computer programming, and high technology industrial production. Finally, knowledge creation is generally estimated using number of patents, number of published papers, and number of scientific citations in international journals (Cornell University, INSEAD and WIPO 2018,,Dutta et al 2014, Khorshid 2018). The final innovation output is concerned with "creative and cultural" products. These products relies primarily on creative and knowledgeable human capital that produces new (or significantly improved) ideas, visions, artistic and culture products that can be measured for example by the percent of creative and culture exports to total size of foreign trade, number of artistic films to population size in millions, size of entertainment and advertising markets per thousands of population, and output of printing and publishing industries as a percent of transformation industries (UNDP 2016, 2017 and Khorshid et al 2018).

1.3. Approaches for Estimating Innovation

Despite the important role of research and development (R&D) statistics in drafting national science and technology policies and strategies, they do not represent sufficient conditions for assessing the transformation process of societies to a knowledge Economy. It becomes necessary in the knowledge era, to investigate these statistics in light of their contribution to social and economic development. This process can be ensured by measures related to innovation (figure (2)). Given the multi-dimensional and diversifying nature of innovation activities, the innovation indicators should reflect the modernization of society and its knowledge creation capacity via an integrated research and development system, knowledge intensive high value added industries, creative and cultural products, skilled human capital, enabling socioeconomic and institutional environment, and finally an appropriate physical and computational infrastructure. In figure (2), innovation is globally estimated using two alternative approaches or models. The first approach adopted by UNESCO and OECD organizations, treats innovation process as a production function with input and output indicators. Output indicators of the innovation process is divided into product, process, organizational and marketing innovation. Output statistics include also measures of the resulting impact and different barriers of innovation. Inputs include factors used in the production of innovation output, information in support of innovation as well as institutional cooperation and

financing means. The second approach assumes that innovation is in principle created by educated, skilled, competent and knowledgeable societies. Innovation statistics should coop with this hypothesis by enlarging the scope of their inputs and outputs. On the input front, indicators are grouped under socioeconomic, institutional, physical and information infrastructure (commonly known as enabling environment), in addition to other physical inputs such as research and development, education and training, patent statistics and finance. Outputs include in principle knowledge and technology innovation as well as creative and cultural outcomes. Based on this second approach, a number of worldwide indices are currently developed to estimate innovation inputs, outputs, efficiency and impact. These are the global innovation index (GII) (Cornel University, INSEAD and WIPO 2018), OECD innovation output index (Vertesy and Derss 2016), Innovation union score board (IUS) (Hollanders 2014), and the Asian creativity and productivity index (CPI), (Khorshid 2018).

Figure (2). Approaches for Estimating Innovation

2. Methodology for Estimating the Egyptian Governorate Innovation Index

The Egyptian governorate Innovation composite Index (GICI) hierarchical structure includes 4 levels which are pillars, sub- pillars, sub-indicators and variables. To represent the production sphere of innovation, the composite index is primarily divided into innovation inputs and outputs. The sub-pillar level includes enabling environment

and the factors of production with respect to the input side while the other three sub-pillars represent the output side which are private-sector innovation support, marketing and organisational innovation as well as the societal innovation. Private innovation is directed mainly to citizens (or households) and investors and hence considered as sub-indicators. The remaining level of the composite index is composed of variables to be estimated using surveys and computed data. Each of these pillars, sub-pillars and sub-indicators is constructed in accordance with the standard international methodologies for the developing composite indicators (OECD 2008). In what follows we will explain in some detail the steps used in constructing each of these indicators.

2.1. Conceptual Structure of the Egyptian Governorate Innovation Index

The Egyptian governorate innovation composite index (GICI) is designed to reflect on one hand, multiplicity of purposes, sources of production, alternative domains and extending impact characterizing the innovation process, and to provide on the other hand, appropriate estimates to the components of its production function. The structure of the Egyptian governorate innovation composite index is illustrated in figure (3). As a production process, the composite index is primarily broken down into input and output pillars. The Input pillar is further divided into factors used to produce innovation Outputs, and their enabling environment (sub-pillars). The factors of production sub-pillar include human capital (composed of labor, education level, skills and competences) needed to generate creative processes, goods or services. The estimation of this sub-pillar depends on three sub-indicators related to the number of registered students in Ph.D. and MSc degrees, as well as the graduates of general secondary and vocational schools having advanced grades. These indicators reflect in a way the characteristics of the "knowledge workers" to be involved in the production of innovation products or processes. Another sub-pillar of factors of production is patent statistics. Patent statistics is considered an important innovation input that can be commercialized or marketed in the goods and services markets, if appropriate financing is afforded. According to the structure of innovation inputs, both new established small and medium industries, and advanced technology enterprises are considered also as a support to the creation of the innovation generated within the production activities producing goods and services.

Figure (3) illustrates also the enabling environment as part of the input pillar contributing to the Estimation of the Egyptian governorate innovation composite index (GICI). This sub-pillar is further disaggregated into the cooperation with research centers and universities in order to incubate creative ideas and generate innovation products or processes. Cooperation of research and innovation projects with the outside world, forms also another type of enabling environment. On the output front, the index estimates private innovation output directed to citizens and investors. This innovation support from governorates is done on a personal basis including services to households or private entrepreneurs. The second type of innovation is related to the significant improvements in the organizational structure of companies and their marketing policies. The last type of innovation output is concerned with innovative societies, characterized by creative human capital and advanced technologies, capable of coping with the knowledge era of the twenty-one century. This "societal innovation" is broken down into measures related to significantly improving the green economy and sustainable development, and other efforts directed to significantly modernizing and enhancing governorate's infrastructure.
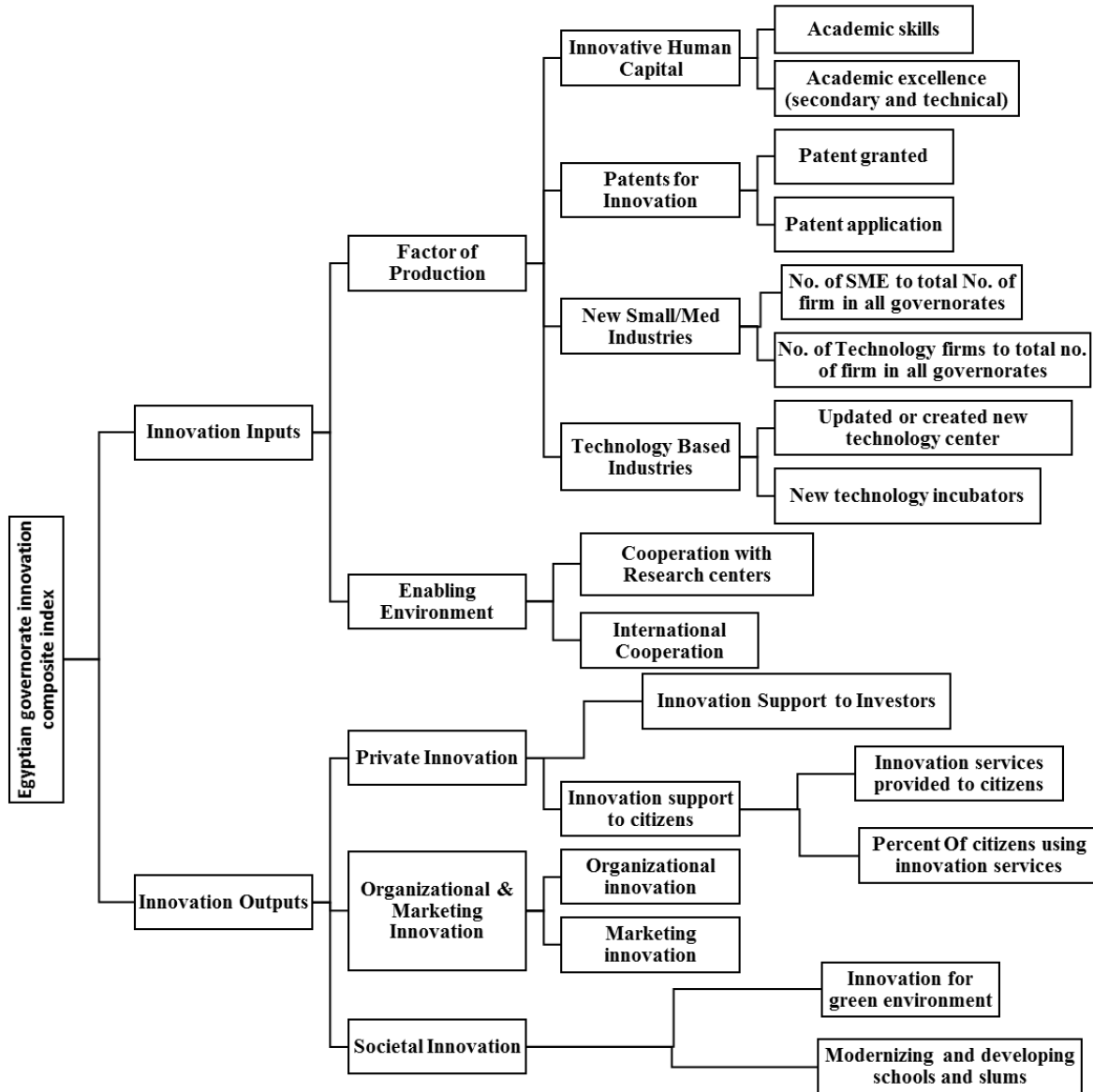
Figure (3). Conceptual Structure of Egyptian Governorate Innovation Index

2.2 Variables Selection

The selection of the individual variables, included in the construction of each indicator (or sub-indicator), relied on a well-defined clear scientific methodology based on international and local literature. In addition, the concepts and experience from international organisations and agencies in estimating R&D and Innovation activities are employed.

Principal Components Analysis was used to confirm the consistency of the selected variables and their classification into various sub-indicators. These results supported the consistency of the conceptual design in selecting the variables and their classification into various subgroups, in which the explained variance ratio in most cases exceeded 50 per cent (Hair et al 2015). The results of the in-depth correlation analysis and alpha Cronbach coefficient confirmed the validity of the selection and classification of the variables, in which the alpha Cronbach coefficient exceeded 0.70 in most of the cases.

2.3. Data Collection and Organisation

The values of the 17 variables incorporated into the construction of the Egyptian GICI are collected using survey methodology. The survey questionnaire was designed by the Egyptian Science, Technology and Innovation Observatory (ESTIO) of the Egyptian Academy for Scientific Research and Technology (ASRT). The survey was designed and submitted to all governorates based on support from the Ministry of Higher Education and Scientific Research, and the Ministry of Local Development. The number of governorates participated in filing the questionnaire reached 22 governorates (which are Aswan - Port Said - Beheira - Beni Suef - South Sinai - Giza - Dakahlia - Damietta - Sohag - Suez - New Valley - Eastern - North Sinai - Western - Fayoum - Qalyubia - Qena - Kafr El Sheikh - Matrouh - Menoufia - Minya - Red Sea).

For the sake of transparency, simplicity and the possibility of repeating the results, no attempts were made to impute missing values to various variables. The use of the arithmetical mean formula in computing an indicator is equivalent of imputing each of the missing values of the indicator to the mean value of the variable. Data-processing was performed on the assumption that the data were error-free, the team having reviewed it more than once to ensure there were no errors in the data entry. The variables that might lead to a biased indicator value were treated using suitable statistical methods (Groeneveld and Medien 1984). It had been observed that some indicators were linked to other, Size-dependent indicators, such as population. These indicators were therefore rescaled using the size.

2.4. Normalisation and Weighting

The values of variables were normalised in the range [0,100] in which the higher values indicated better results. The rescaling or (maximum – minimum) method was used, in which the maximum and minimum indicate the largest and smallest value of the available indicator values respectively. The normalisation criterion depends on whether the variable is good i.e. has a positive relation with the overall index, or bad i.e. has a negative relation with the overall index. The good indicators are normalised using the following formula:

Normalised indicator value of the governorate = 100 X

$$\left(\frac{\text{raw indicator value of the governorate - raw minimum value of the indicator across governorates}}{\text{raw maximum value of the indicator across governorates - raw minimum value of the indicator across governorates}} \right)$$

In the case of the bad indicators i.e. indicators with an inversely correlated relation, the formula is adjusted as follows:-

Normalised indicator value of the governorate = 100 X

$$\left(\frac{\text{raw maximum value of the indicator across governorates - Raw indicator value of the governorate}}{\text{raw maximum value of the indicator across governorates - raw minimum value of the indicator across governorates}} \right)$$

Different weights are used in the construction of pillars, sub-pillars, sub-indicators and variables of The Egyptian Innovation Index. Equal weights are used in the absence of clear evidence of the diversity of significance of each indicator, as well as in the absence of sound and complete information concerning the existence of causal relationships or a lack of consensus on a classical method for estimating weights. In our case, the design and the disaggregation levels of the innovation index suggest the existence of logical differences , confirmed to some extend by statistical tests and scientific understanding, between the relative importance of sub-pillars, sub-indicators and variable with respect to their impact on the aggregate composite index. Although the pillar level suggests that aggregate inputs and outputs might have equal weights, the breakdown of the sub-pillar level assumes the existence of different weights. For example, we assumed that factors contributing to the production of innovative services of governorate are more important than their enabling environment. Furthermore, factors of production sub-pillar is composed of the two leading inputs to innovation which are the human capital for innovation and patent statistics, whereas the enabling environment in the index is limited to cooperation with research centres and universities and international linkages. Based on this rationale, factors of production sub-pillar is allocated 70 percent weight whereas the enabling environment is assigned 30 percent weight. Within the factors of production human capital for innovation, patent statistics, new established SME industries and technology based projects are assigned the following weights (40,30, 15,15) respectively. Based on the same logic and scientific understanding, the output pillar is decomposed into support to household service and private investors (with 40 percent weight), societal innovative services (composed of the green economy innovation and modernising infrastructure) with 40 percent weight. The remaining weight (20 percent) is allocated to innovation directed to improving marketing methods and enhancing organisational behaviour.

2.5. Index computation

The Egyptian Innovation Capital Index was calculated for 22 Egyptian governorates using the most recent and best available data for the various variables of each governorate. The values of the composite index for the Egyptian Innovation Index were calculated by applying a series of successive aggregations starting with the (more detailed level of) variables and ending by attaining the overall index.

The most well-known aggregations method is the arithmetic (or linear) method. The linear aggregation formula of the sub-indicators (SI_j) to compute the composite index *(CI)* takes the following form:-

$$CI = \sum_{j=1}^{n} w_j \times SI_j$$

Where CI is the proposed composite index to be computed, W_j is the relative weight of the sub-indicator SI_j, n the number of sub-indicators aggregated to form the composite indicator. The arithmetical (or linear) aggregation method is employed to compute all the Egyptian governorate Innovation Composite Index (GICI) pillars, sub-pillars, sup-indicators and Variables in this paper.

3. Analysis and discussion of the Results

The questionnaire was designed and implemented within The auspices of the Egyptian Science, Technology and Innovation Observatory (ESTIO) at the Academy of Scientific Research and Technology (ASRT), and it was submitted to all governorates with support from the Ministry of Higher Education and and state for Scientific Research, and the Ministry of Local Development. As explained previously, the number of governorates participating in the questionnaire reached 22 governorates. Results of applying GICI to the Egyptian governorates are recorded in tables from (1) to (8) and figures from (4) to (8).

3.1 Innovation Performance of Governorates

In tables1,2 and 3, the innovation composite index along with its disaggregated inputs and outputs for each Egyptian governorate are shown. The value of the composite index ranged from 40 percent in case of Kafr El Sheikh governorate to 75 percent for Giza governorate. Giza succeeded to realise the best innovation value of input record (55 percent). This result is the outcome of both the performance of the factors producing innovation, and the enabling environment sub-pillars, which marked 53 percent and 69 percent, respectively. In most of Egypt's governorates, the composite innovation index exceeds 50 percent on the average. Four governorates recorded however an average performance that falls below 50 percent. These are Ben Sweef, Kalioubia, Red Sea and Kafr El Sheikh. Input measures to Egypt's governorate innovation index are generally limited (or having low performance). All governorates except Giza has a mean value less than 50 percent. Giza's performance accounts for 55 percent, whereas other governorates record performance values ranging from 18 percent in case of Matruh governorate to 48 percent in case of New Valley governorate. These results suggest then that the Egyptian government should revise its strategy towards more intensive supporting policies to enhance innovation inputs of governorates. Despite the delimited performance of innovation input sub-pillars, output pillars of most Egyptian governorates generate good results. Based on the outcome from the innovation composite index, the value of output aggregate pillar ranges from 53 percent to around 100 percent. From the 22 governorates, 16 governorates record indicators that exceed 80 percent, 18 governorates produce indicators that exceed 70 percent, and 21 governorates generate indicators that exceed 60 percent. On the other hand, more than 50 percent of the Egyptian governorates generates input performance measure that falls below 30 percent. In general, the deteriorating performance of innovation inputs is associated with the deteriorating measures of the factors of productions (composed mainly of innovative human capital and patent statistics). The set of inputs indicators contributing to the production of innovation output ranged from 6 percent to 53 percent. Furthermore, the performance of Egyptian governorates witnesses a differentiating nature with respect to the measures of the factors of production. On other front, private support to investors and households represents the best output performance measure of the Egyptian governorates. It exceeded other output Variables such as marketing, organisational and societal innovation. Finally, the innovation process of governorates has benefited from the appropriate enabling environment. This enabling environment is reflected in two sub-indicator which are international cooperation, and scientific coordination between governorates, and independent research centres and universities. More than half of the Egyptian governorates marks more than 50 percent with respect to the measured value of the enabling environment.

Table (1). Input and output pillars of the composite innovation index

	Composite Index	Innovation Inputs	Innovation Outputs
Giza	75.30	55.00	95.60
New Valley	70.51	46.89	94.13
Port Said	69.25	38.49	100.00
Suez	67.99	36.72	99.27
Aswan	65.36	32.19	98.53
Beheira	65.28	32.03	98.53
Sohag	64.72	32.23	97.20
Damietta	64.00	30.65	97.36
Menoufia	60.12	23.18	97.07
Sharkia	59.32	23.03	95.60
Dakahlia	58.77	30.81	86.73
Qena	58.51	28.74	88.27
North Sinai	58.39	18.99	97.80
Matruh	58.36	18.93	97.80
Gharbiya	56.14	32.66	79.61
Fayoum	54.11	20.32	87.90
Minya	51.85	22.77	80.93
South of Sinaa	50.71	24.53	76.90
Bani Sweif	45.11	23.22	67.00
Qaliubiya	42.38	23.62	61.13
Red Sea	41.98	22.46	61.50
Kafr El-Sheikh	40.69	27.57	53.80

Table (2) Innovation input Pillar and sub-pillars by governorate

297

	Innovation Inputs	Enabling Environment	Factor of Production
Giza	55.00	59.16	53.22
New Valley	46.89	61.64	40.57
Port Said	38.49	77.73	21.68
Suez	36.72	37.38	36.43
Gharbiya	32.66	35.65	31.38
Sohag	32.23	90.10	7.44
Aswan	32.19	51.49	23.92
Beheira	32.03	65.35	17.75
Dakahlia	30.81	35.65	28.73
Damietta	30.65	65.35	15.78
Qena	28.74	50.50	19.42
Kafr El-Sheikh	27.57	49.26	18.28
South of Sinaa	24.53	61.64	8.62
Qaliubiya	23.62	41.10	16.13
Bani Sweif	23.22	39.36	16.30
Menoufia	23.18	37.38	17.09
Sharkia	23.03	48.52	12.11
Minya	22.77	59.16	7.17
Red Sea	22.46	60.65	6.09
Fayoum	20.32	39.36	12.17
North Sinai	18.99	35.65	11.85
Matruh	18.93	39.36	10.17

Table (3). Innovation output pillar and sub-pillars by governorate

	Innovation Outputs	Private Innovation	Organizational & Marketing Innovation	Societal Innovation
Port Said	100.00	100.00	100	100
Suez	99.27	98.17	100	100
Aswan	98.53	96.33	100	100
Beheira	98.53	96.33	100	100
North Sinai	97.80	94.50	100	100
Matruh	97.80	94.50	100	100
Damietta	97.36	93.40	100	100
Sohag	97.20	93.00	100	100
Menoufia	97.07	92.67	100	100

Giza	95.60	89.00	100	100
Sharkia	95.60	89.00	100	100
New Valley	94.13	85.33	100	100
Qena	88.27	70.67	100	100
Fayoum	87.90	94.50	50.5	100
Dakahlia	86.73	91.57	50.5	100
Minya	80.93	52.33	100	100
Gharbiya	79.61	98.53	100	50.5
South of Sinaa	76.90	67.00	50.5	100
Bani Sweif	67.00	67.00	100	50.5
Red Sea	61.50	78.00	50.5	50.5
Qaliubiya	61.13	52.33	100	50.5
Kafr El-Sheikh	53.80	34.00	100	50.5

3.2 Statistical Analysis of Results

In this section, a descriptive analysis is carried out to assesses the statistical parameters (such as the average value, the standard deviation, the maximum and minimum values) associated with the composite index as well as its pillars, sub-pillars and sub-indicators (Tables from 4 to 8 and figures from 4 to 8). The results reveal the following analytical points.

1. The statistics of the Egypt's composite index and its pillars are shown in table(4), whereas the scatter diagram of Governorates are schematised in figure(4). The mean value of the Egyptian governorate innovation composite index is around 61 percent, and the performance of Governorates ranges generally from 44 to 77 percent. This would suggest that the Egyptian governorate innovation performance is on the medium-high level. This result is confirmed by a low standard deviation (representing 1/6 of the mean value), which would suggest the increase of the degree of confidence in the obtained statistics.

2. Figure (4) shows the scatter diagram of the Egyptian composite index for the tested governorates. Despite the existence of some extreme points (such as Kafr-elsheikh and Giza governorates), the value of the composite index of governorates falls generally nearby, or around its average value, which is computed as 60.6 percent.

3. When the innovation composite index is divided into its inputs and outputs (as components of the innovation production function), different analytical results emerge. First, the mean value of innovation Outputs accounts for 87 percent, which is 20 percent higher than the average value of the composite index. The standard deviation of the output pillar is however on the high side (it represents about 62 percent of the mean value). This would certainly reduce the degree of confidence in the positive results of innovation output.

4. Compared to the output pillar, the mean of the innovation input pillar shows a decreasing trend. It does not exceed 35 percent on the average, which represents about half the mean value of the innovation composite index. This result stresses the need of the Egyptian government to adopt more intensive policy packages directed to enhance the innovation inputs in governorates. Furthermore, the scatter diagram of innovation input pillar by governorates (figure (6)) shows that 64 percent of the Egyptian governorates are located below the mean value of the pillar which reaches 34.2 percent. The only exception to this

finding is Giza and the new valley governorates. This result demands also an intensive analytical study to identify the causalities and reasons behind this deteriorating performance.

Table (4). Composite Index statistics – Innovation Inputs and Outputs

Variable	Mean	StDev	Minimum	Maximum
Composite Index	60.58	9.28	43.66	76.78
Innovation Outputs	86.94	53.80	53.80	100.00
Innovation Inputs	34.21	8.53	25.24	57.97
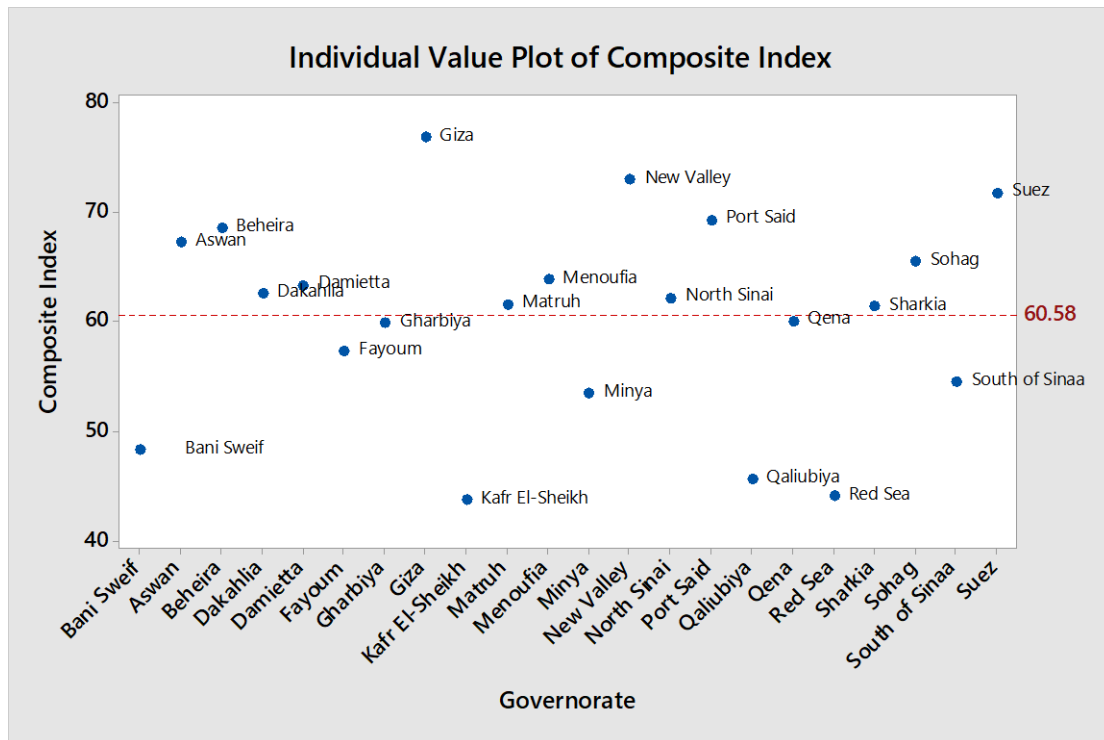
Figure (4) Composite Index Per individual Governorate

5. Table(5) divides the statistical measures pertaining to the innovation output pillar into private innovation support (directed to households and private investors), organisational and marketing innovation measures and societal innovation (broken down into innovation support for green economies and modernisation and development of the governorates infrastructure). The results are generally on the favourable side with a mean value reaching 89 percent, and a standard deviation that does not exceed 21 percent.

6. Given the particular features of the innovation process within governorates, societal innovation should play a more important role in achieving the desired goals. The average value of this sub-pillar is higher than the mean value estimate of the innovation composite index, as well as the innovative support to households and investors. This result coops then with the conceptual innovation rationale.

7. In table (6), the descriptive statistics of the breakdown of the innovation input pillar into sub- pillars are shown (factors of production and enabling environment). The statistical results confirm the deteriorating performance of the factors contributing to the production of innovation output, compared to the enabling environment. The mean value of the factors producing innovation does not exceed 19 percent with a relatively high variance of 12 percent (which represent 60 percent of the mean value). Given this considerable restricted performance, the science and technology policy maker in Egypt should adopt appropriate policy measures directed to enhancing innovation input capacity within governorate. Furthermore, the socioeconomic regional plans and sustainable development strategies need to trace this delimited performance over time. As expected, the enabling environment analytical indicators have shown generally sizeable impact on innovation with a mean value of 68 percent, and standard deviation that is limited to 10 percent.

8. In order to assess the impact of factors of production sub-pillar on Egypt's governorate innovation composite index (GICI), figure (7) decomposes this sub-pillar into its four sub-indicators. The creation of new (or significantly improved) technology-based industries, in support of establishing technology or business incubators and research valleys, has shown reasonable performance with a mean value of 52 percent. This improved performance is meanwhile negatively affected due to the increased standard deviation which represents 62 percent of its mean value. Descriptive statistics show, On the other hand, a clear shortage in providing other factors to generate innovation processes or products (goods and services).

Table (5). Decomposition of innovation output into sub-pillars

Variable	Mean	StDev	Minimum	Maximum
Innovation Outputs	86.94	14.39	53.80	100.00
Private Innovation	83.10	18.17	34.00	100.00
Organizational & Marketing Innovation	91.00	19.54	50.50	100.00
Societal Innovation	88.75	21.23	50.50	100.00
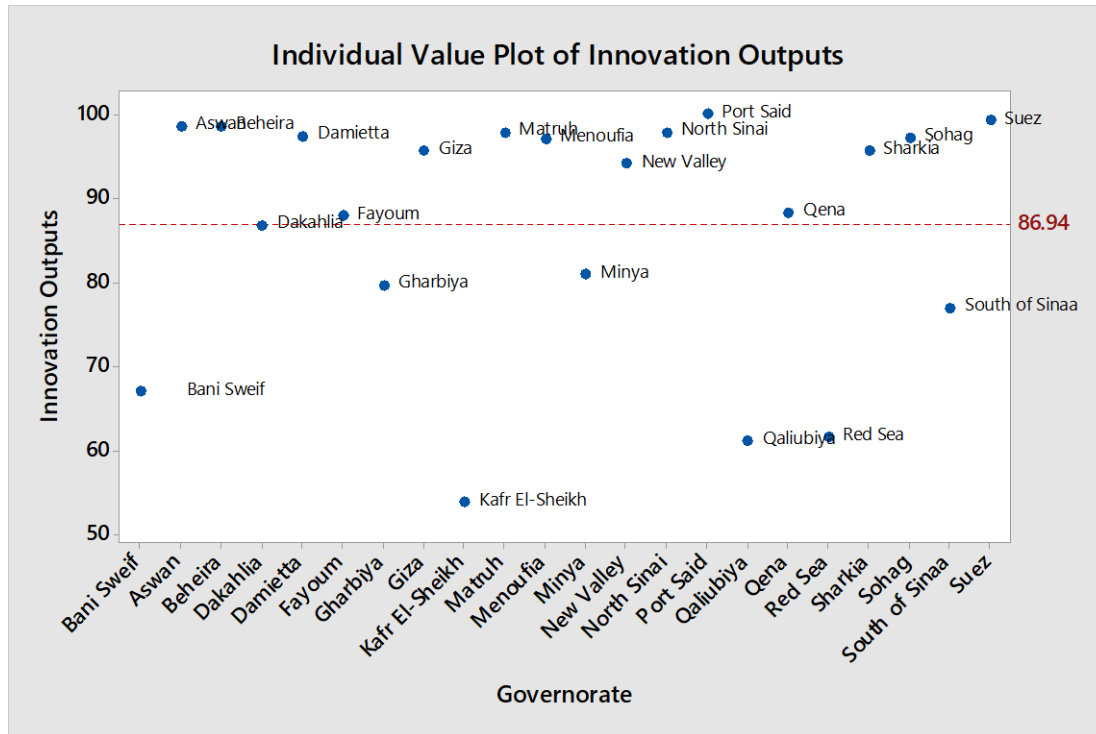
Figure (5). Innovation output Pillar per Governorate

9. The sub-indicator related to the establishment of new (or significantly improved) small and medium size industries reflects in a way, the supporting policies of innovation to the production sphere of the economy. These statistics produce the lowest performance measure which is around 15 percent. Furthermore, its standard deviation exceeded 100 percent of its mean value of performance. Given the growing role of innovation in production activities to achieve economic growth, improve welfare of citizens and satisfy sustainable developed strategies (based on the recommendation of OECD and UNESCO international organisations), appropriate policy measures are strongly needed to address this specific innovation area.

10. Patent statistics is another factor of producing innovation outputs in the Egyptian innovation composite index. Patents are viewed as an important, as well as practical step, towards developing an innovation product or process. A patent application, if properly financed, can produce a new or significantly improved good, service or process that can be commercialised in the economic markets as an innovation outcome. The sub-indicator of patent statistics for innovation in the Egyptian governorate composite index (GICI) generates low performance measures with a mean value of 27 percent and standard deviation of 21 percent (about 78 Percent of the mean value). This law average value with relatively high standard deviation measure stresses the need for intensive policy measures from Egypt's government to support the development and application of patents.

11. Based on international practice and empirical evidence, innovation output cannot be properly produced without skilled, competent and highly educated and trained work force. These knowledge workers are generally needed to form the innovation human capital. Furthermore, human capital development is considered also as a major factor for transforming countries to the knowledge Economy and achieving sustainable development objectives. The collected statistics relevant to the human capital in case of the

Egyptian governorates' innovation index suggest that considerable effort is still needed in this area. Based on the statistical results, the mean value of the human capital measure is only 27 percent, whereas the standard deviation represents 74 percent of this mean value.

12. Table (8) summarises the descriptive statistics of the enabling environment sub-pillar. The enabling environment in the Egyptian governorate innovation composite index is represented by the cooperation with the organisations of the outside world, and the cooperation between the governorate and research centres and universities.

Table (6). Decomposition of innovation inputs into sub-pillars

Variable	Mean	StDev	Minimum	Maximum
Innovation Inputs	34.21	8.53	25.24	57.97
Enabling Environment	68.20	10.36	60.40	95.05
Factor of Production	19.65	11.98	6.09	53.22
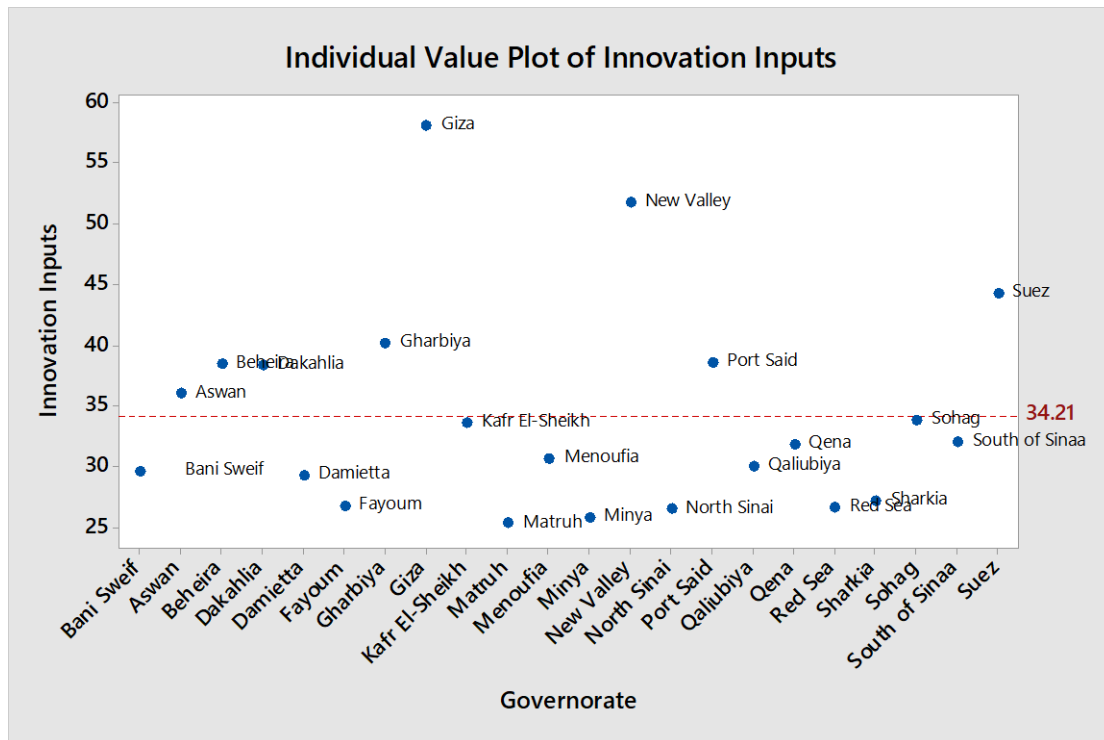
Figure (6). Innovation Input Pillar Per Governorate

Table (7). Factors of production sub-pillar and its decomposition

Variable	Mean	SD	Minimum	Maximum
Factor of Production	19.65	11.98	6.09	53.22
Technology Based Industries	52.75	32.32	1.00	100.00
New Small/Med Industries	15.21	17.56	1.00	53.93
Patents for Innovation	24.81	21.00	1.00	100.00
Innovative Human Capital	26.79	19.48	1.00	66.68

Table (8). Decomposition of the Enabling Environment

Variable	Mean	StDev	Minimum	Maximum
Enabling Environment	68.20	10.36	60.40	95.05
Cooperation with Research Center	61.64	14.81	50.50	100.00
International Linkages	83.500	0.000	83.500	83.500

The mean value of the estimated enabling environment ranges from 62 to 83 percent with a standard deviation that does not exceed 17 percent of the mean value of the indicator. In fact, the openness of governorates to cooperation with outside world and their reliance on technical support provided by research centres and university represents a favourable policy measure characterising the knowledge era and contributes to the characteristics of the industrial revolution of the twenty one century.

4. Conclusion and Policy Recommendation

Innovation is becoming today a major factor in support of science and technology policies and the transformation towards knowledge society and economy. Innovation accelerates economic growth and improves welfare measures of citizens as part of the sustainable development strategy of a country.(Alsan 2016, Bassinini et al 2000,, Pessoa 2010, OECD 2004 and 2010, EBRD 2019, Khorshid 2018, Khorshid and Ismail 2019, Ulku 2004). Based on recent worldwide indicators, innovation is considered a prerequisite for transforming countries to knowledge-based technology- advanced digital economy. The innovation process is generally represented by a multidimensional model composed of ; (i) alternative sources (or institution) producing innovation products or processes, (ii) different application domains of innovation and (iii) alternative type of output generated by the innovation process. Innovation can be for example, generated in research centres or universities, developed in manufacturing or services business sectors, created by society at large. On the other hand, innovation can be assessed considering the domain of application (economic versus social domain). Finally, innovation can be developed based on alternative output forms. This classification can include knowledge and technology outputs, creative and culture industries, and intangible assets.

Given its extended worldwide impact on sciences, technology, knowledge and sustainable development , innovation should be estimated on a frequent bases to determine its development stage and extended impact. Innovation statistics need however to consider four development issues; (i) a conceptual design reflecting the analytical objectives of the composite index, (ii) an innovation production function composed of inputs and

outputs, (iii) an enabling environment broken down into socioeconomic, cultural, institutional and physical infrastructure, and finally (vi) advantages, limitations, impact and scope of application.

In this paper, a special composite innovation index is designed, estimated and applied to the Egyptian case. The Egyptian governorate innovation composite index (GICI) is primarily used to assess the innovation performance on the regional or governorate level. It is decomposed into aggregate input and output pillars representing the components of its production function. Inputs include both factors of production and enabling environment (inputs sub-pillars), whereas outputs are broken down into innovation support to households and private investors, marketing and organisational innovation, and societal innovation.

Results of applying the composite innovation index to the Egyptian governorates reveal a number of analytical points and a set of policy recommendations. The performance of governorates measured by the value of the innovation composite index, shows a moderate attitude. The mean of the composite index ranged from 40 percent in Kafr El Sheikh governorate to 75 percent in case of Giza governorate. The mean value of the innovation composite index across governorates is 60.6 percent, and the standard deviation accounts for 9 percent (or 15 percent of the value of the mean statistic). Giza succeeded to achieve the best mean performance with respect to the set of inputs of the innovation production function, which is estimated as 55 percent. This result applies to both the factors of production and the enabling environment (53 and 59 percent respectively). The mean value of the input sub-pillars for other governorates are generally on the low side. Its The mean value across governorates does not exceed 35 percent. Furthermore, their maximum value accounts respectively for only 58 percent, which does not represent an acceptable result. In light of this finding, Egypt's government needs to consolidate efforts towards enhancing the capacity of innovation inputs, with special reference to the components of the innovation production function.

Despite the restricted or delimited results of innovation input sub-pillars, the mean value of the output pillar of most Egyptian governorates generates good statistics. The mean value of the governorates output pillar ranged from 53 to 99 percent on the average. Furthermore, 16 from the 22 governorates generated a mean value of indicator that exceeds 80 percent. It is noted also that innovation support to households and investors represents the highest performance measure of the output pillar. On other front, more than 50 percent of the Egyptian governorates has generated input performance measure that falls below 30 percent. Based on this rationale, the Egyptian government needs to adopt an integrated policy package directed to reduce the difference in performance between governorates on one hand, and achieve the balance between input and output support for all governorates on the other hand.

In principle, the innovation composite index on the regional or the governorate level is characterised by two distinguishing features; the importance of societal innovation statistics, and the emergence of the enabling environment. Science and technology policy makers should in this respect devote particular attention to these two issues in designing the composite index, when moving from the micro level (a company, an organization or a production activity), to a regional or national level. Both the enabling environment and societal innovation in case of the Egyptian governorates, generated mean values ranging from 68 to about 89 percent, with low standard deviation ranging from 10 to 19 percent. This good performance suggests then that the generation process of innovation, and the relative importance of its statistics are considerably affected by the scope of application (a production unit, a service business, an economic sector, a region, or a country at large).

Based on empirical evidence and analytical studies done by UNESCO and OECD organisations, a production activity (producing goods and services) represents an important source of generating innovation products and

processes. In the Egyptian governorate innovation composite index, this dimension is represented in the sub-indicators concerned with the support to advanced technology based industries(composed generally of research parks and business incubators), and the establishment of new small and medium enterprises (SMEs). Although high technology industrial innovation sub- indicator performed properly (with an mean value of 52 percent and a standard deviation of 32 percent), the support to new modern small and medium industries (SMEs) for innovation needs however additional enhancing policy measures from the government of Egypt(the mean value was less than 16 percent and the standard deviation accounted for 17 percent).

The estimated input statistics suggest that the innovative human capital and patent statistics do not receive appropriate support from the government of Egypt. Their measured mean values were 26 and 24 respectively, with relatively high standard deviation of 73 percent and 88 percent of their means, respectively. Given the importance of these factors of production in generating innovation products and processes, further policy measures are still needed in this respect.

It should be noted finally that this paper tried to capture the distribution of innovation efforts, efficiency and effectiveness among the regions (or governorates) of Egypt. The paper suggests that the difference in innovation performance between governorates should be considered as an important factor in developing national science and technology strategies and innovation national plans as well as their economic impact. Up to the authors knowledge, studies concentrating on the analysis of the regional dimension of innovation are up till now, limited to a great extent.

References:

Aslan, Y. (2016). "A Novel Index for knowledge triangle: The Entrepreneurial and Innovative University Index of Turkey", OECD Conference on Enhancing the Contribution of Higher Education and Research Institutions to Innovation, 15-16 September, Paris. https://www.oecd.org/sti/Session5_Yasemin%20Aslan.pdf

Aspen Institute Italia. (2007). "National Interest: The Showcases of Excellence", Aspen Institute Italia https://www.aspeninstitute.it/

Bassanini, A., Scarpetta, S. and Visco, I. (2000). "Knowledge, Technology and Economic Growth – Recent evidence from OECD Countries" OECD Economics department Working Paper No. 259, OECD Publishing, Paris. https://www.oecd-ilibrary.org/docserver/536435460443.pdf?expires=1594630011&id=id&accname=guest&checksum=E4D526F90ABA98944316845814BC8045

Cornell University, INSEAD and WIPO. (2018). "Global Innovation Index 2018" 11th Edition, Fontainebleau and Geneva. https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2018.pdf

Dutta, Soumitra, Lanvin, B. and Vincent, W. (2014). "The Global Innvation Index – The Human Factor in Innovation" Cornell University, INSEAD, and World Intellectual Property Organization (WIPO) co-publishers. https://www.wipo.int/publications/en/details.jsp?id=3254&plang=EN

Dvir, R. and Pasher, E. (2004). "Innovation engines for knowledge cities: an innovation ecology perspective", Journal of Knowledge Management, 8(5), 16–27. https://www.emerald.com/insight/content/doi/10.1108/13673270410558756/full/pdf?title=innovation-engines-for-knowledge-cities-an-innovation-ecology-perspective

EBRD (2019)" Introducing the EBRD Knowledge Economy Index "European Bank, March. https://www.ebrd.com/documents/policy/download-the-ebrds-knowledge-economy-index.pdf

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Egyptian Science Technology and Innovation Observatory (ESTIO). (2015). "Results of Egyptian National Innovation Survey 2015", Cairo Academy of Scientific Research and Technology. http://www.asrt.sci.eg/ar/index.php/asrt-departments-2/units/estio

Egyption Science Technonolgy and Innovation Observatory (ESTIO). (2017)."Egyptian Science and Technology Indicators" Cairo, Academy of Scientific Research and Technology. http://www.asrt.sci.eg/ar/index.php/asrt-departments-2/units/estio

Ergazakis, K., Metaxiotis, K. and Psarras, J. (2004) "Towards knowledge cities: conceptual analysis and success stories", Journal of Knowledge Management, 8(5), 5–15. https://doi.org/10.1108/13673270410558747

European Commission & Eurostat. (2018). Harmonized Data Collection for the CIS2018, Nederland, April 26. https://www.stat.si/doc/sosvet/Sosvet_15/SosvetSeja10_1543322.pdf

Furman, J.L, Porter, M.E. and Stern, S. (2002). "The determinants of national innovative capacity", Research Policy, 31, pp. 899-933. http://questromworld.bu.edu/jefffurman/files/2012/05/FPS-National-Innovative-Capacity-RP-2002.pdf

Groeneveld, R. A. and Meeden, G. (1984). "Measuring Skewness and Kurtosis", The Statistician, 33, 391–99. http://jse.amstat.org/v19n2/doane.pdf

Grupp.H. and Mogee, M.E. (2004). "Indicators for national science and technology policy: how robust are composite indicators?" Res. Policy, 33(9), 1373-1384. https://doi.org/10.1016/j.respol.2004.09.007

Hair, J., Anderson, R., Tatham, R., and Black, W. (2015). Multivariate Data Analysis, 7th Edition, United States of America: Prentice-Hall International. https://www.amazon.com/Multivariate-Data-Analysis-Joseph-Hair/dp/0138132631

Hollanders, Hugo and ES-Sadki, N. (2014). "Innovation Union Scorboard 2014", European Commission and Maastricht Economic and Social Research Institute on Innovation and Technology (UNI- MERIT). http://ec.europa.eu/DocsRoom/documents/6993/attachments/1/translations/en/renditions/native

Khorshid, M, Ismail, M., Helmy, O and Ramadan, M. (2018). "Development Return on Investment in Research, Development and Innovation", Project First Report, Academy of Scientific Research and Technology, Egypt. www.asrt.sci.eg

Khorshid, M. (2018). Development Return of Scientific Research and Innovation – Approaches and Comparative Performance Measures" in " Scientific Research in the Arab Region – Context, Chalenges and Future Prospects" The Arab Thought Foundation, Tenth Arabic Report, Beirut, Lebanon. https://www.arabthought.org/en/researchcenter/index

Khorshid, M and Ismail, M. (2019). "The Economic Impact of Investment in R&D – Macroeconomic Approach", Project Second Report, Academy of Scientific Research and Technology, Egypt. www.asrt.sci.eg

Khorshid, Motaz. (2015a). "Measuring Research, Development and Innovation Indicators for the Arab Countries – A Concept paper", Arab knowledge Report, UNDP, Beirut, Lebanon. http://www.undp.org/content/dam/rbas/report/UNDP-GENERAL-REPORT-ENG.pdf

Laursen, K., Salter, A. (2006). "Open for innovation: The role of openness in explaining innovation performance among UK manufacturing firms". Strategic. Management. J. 27, 131–150. https://doi.org/10.1002/smj.507

Mahroum, Y. Al-Saleh. (2013). "Towards a functional framework for measuring national innovation efficacy Technovation, 33(10–11). 320-332. https://www.researchgate.net/publication/259117827_Towards_a_functional_framework_for_measuring_national_innovation_efficacy

Metaxiotis, K., Ergazakis, K., Psarras, J. and Askounis, D. (2006). "Know Cis: a unified methodological approach for the development of knowledge cities", Journal of Knowledge Management, 10(5), 65–78. https://doi.org/10.1108/13673270610691189

OECD (2002) "Frascati Manual – Proposed Standards Practice for Surveys on Research and Experimental Development", OECD. https://www.oecd-ilibrary.org/science-and-technology/frascati-manual-2002_9789264199040-en

OECD (2004) "Innovation in the Knowledge Economy – Implication for Education and Learning" Center for Education Research and innovation, OECD Publishing, Paris. https://www.oecd-ilibrary.org/education/innovation-in-the-knowledge-economy_9789264105621-en

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

OECD (2005) "Oslo Manual – Guidelines for collecting and Interpreting Innovation Data", Third Edition, A joint publication of OECD and Eurostat, Paris. https://ec.europa.eu/eurostat/en/web/products-manuals-and-guidelines/-/OSLO

OECD (2008) Handbook on Constructing Composite Indicators: Methodology and User Guide. Paris: OECD. https://www.oecd.org/sdd/42495745.pdf

OECD (2010a) "Measuring innovation a new perspective", OECD Publications, Paris.

OECD (2010b) "The OECD Innovation Strategy, Getting a Head Start on Tomorrow" , OECD Publishing, Paris. https://www.oecd.org/sti/the-oecd-innovation-strategy-9789264083479-en.htm

OECD/Eurostat (2018) "Oslo Manual 2018: Guidelines for Collecting, Reporting and using Data on Innovation", 4th Edition, OECD Publishing Paris, Eurostat, Luxemburg. https://www.oecd.org/science/oslo-manual-2018-9789264304604-en.htm

Pessoa, A. (2010). "R&D and economic growth: How strong is the link?", Economics Letters, 107, 153-154. https://www.sciencedirect.com/science/article/pii/S016517651000011X

Porter, M.E., Stern. (1999). "The New Challenge to America's Prosperity: Findings from the Innovation Index" , Council on Competitiveness, USA https://www.hbs.edu/faculty/Publication%20Files/Downloads_Porter_index1_el_be68d54c-4990-45da-88c0-ee754c99ffdb.pdf

Radwan, Amr and Sakr, Mahmoud. (2018). "Exploring 'brain circulation' as a concept to mitigate brain drain in Africa and improve EU–Africa cooperation in the field of science and technology", South African Journal of International Affairs, 25(4), 517-529. https://doi.org/10.1080/10220461.2018.1551151

Radwan, Amr. (2018). "Science and innovation policies in North African Countries: Exploring challenges and opportunities". Entrepreneurship and Sustainability Issues, Entrepreneurship and Sustainability Center, 2018, 6 (1), 268-282. https://doi.org/10.9770/jesi.2018.6.1(17) ⟨hal-02121204⟩

Rezk, M. R. A., Ibrahim, H., H., Tvaronavičienė, M., Sakr, M. M. and Piccinetti, L. (2015). "Measuring innovations in Egypt: case of industry", Entrepreneurship and Sustainability Issues, 3(1), 47-55. https://doi.org/10.9770/jesi.2015.3.1(4)

Scheel, C. (2011). Innovacities: in search of breakthrough innovations producing world-class performance," International Journal of Knowledge-Based Development, Inderscience Enterprises Ltd, 2(4), 372-388. http://www.inderscience.com/link.php?id=44310

Sofka, W. and Grimpe, C. (2010), "Specialized search and innovation performance-evidence across Europe". R&D Management, 40, 310–323. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-9310.2010.00592.x

Ulku, Hulya. (2004). "R&D, Innovation, and Economic Growth: An Empirical Analysis", IMF Working Paper 04/184. https://www.imf.org/en/Publications/WP/Issues/2016/12/30/R-D-Innovation-and-Economic-Growth-An-Empirical-Analysis-16927

UNDP (2015) "Arab knowledge Indicator". UNDP/RBAS & Mohamed Bin Rashid knowledge Foundation, Dubai. https://www.knowledge4all.com/uploads/files/AKI2015/PDFEn/AKI2015_Full_En.pdf

UNDP. (2017). "Global knowledge Index" UNDP/RBAS & Mohamed Bin Rashid knowledge Foundation. https://knowledge4all.com/uploads/files/KI2017/Summary_en.pdf

UNESCO Institute of Statistics (2017) "Summary Report of the 2015 UIS Innovation Data Collection", Information Paper N.73, March. http://uis.unesco.org/sites/default/files/documents/ip37-summary-report-of-the-2015-uis-innovation-data-collection-2017-en.pdf

Vertesy, Daniel and Derss, Richard (2016), "The Innovation Output Indicator 2016", Luxembourg: Publication office of the European Union https://publications.jrc.ec.europa.eu/repository/bitstream/JRC100825/innovation%20output%20indicator%202016%20report%20pubsy_fin.pdf

Wonglimpiyarat, J. (2010)."Innovation index and the innovative capacity of nations", Futures, 42(3 April) 247-253. https://doi.org/10.1016/j.futures.2009.11.010

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

World Bank. 2007. Building Knowledge Economies: Advanced Strategies for Development. WBI Development Studies. Washington, DC: World Bank. © World Bank. https://openknowledge.worldbank.org/handle/10986/6853

Motaz KHORSHID is a former minister of higher education and Scientific Research; He is a professor of decision support and modeling. He has expertise socioeconomic development Planning, computer aided Modeling and Decision Support Systems (DSS), computer Simulation Methodology, Economy-wide Modeling and Analysis, in addition to Management of Higher Education and Scientific Research. In the present study, Khorshid prepared the manuscript, preformed analytical review and supported the analysis of the study.
ORCID ID: https://orcid.org/0000-0002-5932-0098

Mohamed Ramadan A. REZK is currently the director of Egyptian Science, Technology and Innovation Observatory (ESTIO) at the Egyptian Academy of Scientific research and technology (ASRT). He has a Ph.D. in nanotechnology. He has expertise in the evaluation of science, technology, and innovation systems, foresight and scenario writing and in creation of composite index. In the present study, Mohamed conceived and designed the study, preformed analytical review and supported the data analysis.
ORCID ID: https://orcid.org/0000-0002-7677-3072

Mohamed ISMAIL is chief of Department of Statistics, Faculty of Economics, Cairo University, he has expertise in principles of statistics, regression analysis, linear models, econometrics, math- ematical economics, statistical software and statistics for economists, In the present study, Mohamed prepared preformed the statistical analysis of composite index and supported the analysis of the study.
ORCID ID: https://orcid.org/0000-0002-7787-5302

Amr RADWAN is the Head of Research and Innovation Management Department at the Egyptian Academy of Scientific Research & Technology (ASRT). Amr is an experienced researcher in the fields of innovation systems, research governance, science policy and technology development, and authored several regional strategies and roadmaps for science, technology development and Innovation. He has a PhD in pharmacology with professional industry experience and has also obtained Master of Business Administration (MBA) and a several diplomas in Intellectual Property Rights and Innovation Management. In the present study, Amr prepared the manuscript, preformed analytical review and supported the analysis of the study.
ORCID ID: https://orcid.org/0000-0002-5567-6708

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Mahmoud M. SAKR has been the Head of Genetic Engineering & Biotechnology Division at the national research center in Egypt before he has been appointed as the executive director of Science, Technology and Development Fund in Egypt. He is currently the President of the Academy of Scientific Research and Technology/Ministry of scientific research in Egypt. He has been awarded many national awards including the State Prize for scientific encouragement in advanced biotechnology. He is a member of several strategic committees at national and international bodies, steering boards of a number of Egyptian research institutions and has managed national and multinational compete projects. In the present study, Mahmoud supported the manuscript writing, analysis of data and overall design.
ORCID ID: https://orcid.org/0000-0001-9467-9250

CONCEPTUAL MODEL OF CORPORATE SOCIAL RESPONSIBILITY IMPACT ON COMMUNITY WELL-BEING*

Iskandar Zainuddin Rela[1*], Abd Hair Awang[2], Zaimah Ramli[3], Muhammad Rusdan[4], Musadar Mappasomba[5], Anas Nikoyan[6]

[1,5,6]*Department of Agricultural Extension, Halu Oleo University, Kampus Hijau Bumi Tridharma, Kendari, Southeast Sulawesi 93132. Indonesia*
[2,3] *Development Studies, Faculty of Social Sciences and Humanities, Universiti Kebangsaan Malaysia (UKM), 43600 UKM Bangi, Selangor, Malaysia*
[4]*PT. Antam Pomalaa. Sulawesi Tenggara, Jl. Letjen TB Simatupang No. 1 Lingkar Selatan, Tanjung Barat Jakarta 12530, Indonesia*

E-mails: [1]sikkyach@yahoo.com (corresponding author); [2]hair@ukm.edu.my; [3]zaimahr@ukm.edu.my; [4] muhammad.rusdan@antam.com; [5] musadar@uho.ac.id; [6]anikoyan@scf.or.id*

Abstract. Sustainable mining industry contributes to the community well-being and country development. Thus, this research constructs a measurement and model in conducting an empirical study on the corporate social responsibility (CSR) practice and community well-being (CWB) in the mining industry. Accordingly, this study aims to review the structural analysis of CSR and CWB in this particular mining industry. CSR focused on four main dimensions, namely, economic, legal, ethical, and philanthropic. By contrast, CWB is focused on the dimensions of social, economic empowerment, environment, health, service, and facilities. This study also proposes a structural relationship model between CSR practice and CWB in the surrounding mining industry. Research hypotheses were formulated on the basis of the proposed model. This study concludes with a suggested future research.

Keywords: structural equation model, mining industry; corporate social responsibility; sustainable development; community well-being

1.   Introduction

Mining can provide for the welfare of the state and community, but mining activities also have a negative impact on both (Zhao et Al. 2009; Leonard, 2017; Leonard and Lebogang, 2018). Activities result in topsoil erosion, flora destruction, air and water pollution, health difficulties, spoilage of aquatic life species, and social conflict (Kitula, 2005; Corral, Melanie and Earle 2009; Gómez-Álvarez et al., 2011; Gutti et al, 2012; Grozdanovic, Bijelić and Marjanovic, 2018; Katoria et al., 2013). Mining of natural resources requires sustainable management to ensure that society, the economy, and the environment are maintained and conserved (Measham et. al. 2013). The companies in the mining sector can sustainably run in the future if they focus on the role of corporate social responsibility (CSR) on the various dimensions of the people's welfare. Therefore, CSR provides an important role in the process of social development, sustainable development, and community well-being (CWB), mainly of the local communities by considering the expectations of stakeholders (Freeman, 1984; Frynas, 2009; Walton, McCrea and Leonard, 2014); Sarmila et al., 2015) and CSR is able to maintain environmental sustainability and respond positively to the survival of community (Asmeri, Alvionita and Gunardi, 2017).

Previous research has identified the assessment of CSR implementation with various dimensions, such as economic, legal, ethical, and discretionary (Carroll, 1979); economic, social, and environmental (Elkington, 1994); corporate cause promotions, cause-related marketing, corporate social marketing, corporate philanthropy, employee volunteering, and socially responsible business practices (Kotler and Lee, 2005); leadership, vision and values, and stakeholder engagement and marketplace, workforce, supply chain, community, and environmental activities (Researchers from the Ashridge Business School in Danish Commerce and Companies Agency, 2005); economic, social, environmental, stakeholder, and voluntariness (Dahlsrud, 2008). Recent studies that assessed CSR via business excellence models referred to economic, social, environmental, stakeholder, and voluntariness dimensions (Jankalová and Jankal, 2017). CSR dimension has been used to assess the impact of CSR implementations on stakeholders (community, customer, employer, and government) (Ismail, 2009; Lane and Devin, 2018; Rhee, Park, and Petersen, 2018; Phiri, Mantzari and Gleadle, 2019).

As one of the stakeholders, the community requires attention as the recipient of the impact of CSR implementation. Community involvement in CSR practices will help companies build positive perceptions, corporate reputation, trust, and customer loyalty (Deigh, Farquhar, Palazzo, and Siano, 2016). In the case of CSR implementation in the banking Industry, the CSR practice helped enhance overall performance (Narwal, 2007). Similarly, CSR affects financial performance in the European banking industry (Gangi, Mustilli, and Varrone, 2019). In the case of the hotel industry, CSR (responsibility to customers, employees, and society) influences customer behavioral loyalty. Generally, CSR implementation can positively affect the company more than the stakeholder.

Achua and Utume (2015) concluded that CSR impact on the community, from the perspective of the community, was extremely low in all levels. Recent studies from Gaither, Austin, and Schulz (2018) recommended that future research may involve case studies by looking at companies having social and environmental impacts and economic success. Similarly, the study by Hoi, Wu, and Zhang (2018) found CSR activities and the community-level corporate engagement in negative CSR activities. Positive CSR activities enhance a firm's future financial performance. In conclusion, the impact of CSR practice to improve CWB still gains attention in identifying weaknesses and strengths of cases in various countries. Then, the researcher's view is how the CSR dimension can provide a positive impact on the overall dimensions of CWB, such as social, economic, cultural, environmental, and political (McCrea et al., 2014; Walton, McCrea and Leonard, 2014; Lee and Kim, 2015).

In the same context, Arnold (2017) explained that among the initial benefits of CSR is the improvement of the

relationship between companies and communities. Matten and Moon (2008) defined CSR as a policy of action implemented by parties to reflect their responsibility and subsequently advance social interests. Kotler and Lee (2005) believed that CSR improves the people's well-being through the use of company resources. Therefore, each company is expected to create a positive impact on CWB through a CSR program. Murphy (2010) and Hart (1999) stated that CWB is a conceptual framework that incorporates the social, economic, environmental, cultural, and political dimensions identified by individuals and communities. Therefore, the current research aims to form a conceptual model of CSR impact on CWB in the mining industry. The following sections provide the literature review, hypothesis development, proposed research models, conclusions, and future research agenda.

2. Literature Review

The main construct in this research is the company's CSR practice to the community. The company has a legal obligation to socially and economically benefit a community. Accordingly, we adopt "stakeholder theory" because it is rooted in complex business environment relationships (Freeman, 1984, cited in Roberts, 1992, p. 597). This theory explains the nature of the corporation as a legal entity affected by economic and non-economic players with economic and social obligations (Muthuri and Gilbert, 2011). Thereafter, CSR and CWB are explained on the basis of the definition and previous research reports.

2.1 Concept of CSR

CSR can be interpreted as a corporate moral responsibility to the community around the workplace and its operations area. Carroll (1991) defined CSR as economic, legal, ethical, and voluntary aid that organizations provide to a community. Beal (2013) noted that government CSR is a form of commerce that aims to harmonize their values and behaviors against the needs of interested parties, such as users, wholesalers, workers, providers, communities, supervisors, and other interest groups. Dahlsrud (2008) distributed the definition of CSR into five dimensions, namely, environment, social, economic, stakeholder, and volunteer dimensions of philanthropy. In this context, Khoury, Rostami and Turnbull (1999) stated that CSR covers the relationship between government and all stakeholders, such as customers, workers, communities, wholesalers, governments, suppliers, and competitors.

Hopkins (1998) argued that CSR plays a role in morally and responsibly protecting stakeholders to achieve two-sided goals: to retain the benefits of improving the lives of stakeholders within and without the government. Similarly, Basu and Palazzo (2008) defined CSR as a government countermeasure against stakeholders regarding commercial operations and social affairs. The stakeholders include governments, NGOs, and users. In terms of social perspective, Davis and Blomstrom (1975) indicated that CSR should be oriented toward actions taken by a firm to protect and improve social welfare and government interests as well as run the government by maintaining and improving social welfare (Kotler, Saliba, and Wrenn, 1991). The CSR model of Carroll (1991) indicates that CSR comprises four types of social responsibility, namely, economic, legal, ethical, and philanthropic. This model is the most acceptable in measuring corporate responsibility for the implementation of CSR programs (Carroll and Shabana, 2010; Taneja, Taneja, and Gupta, 2011; Carroll and Buchholtz, 2014; Choi and Yu, 2014; El-Garaihy, Mobarak, and Albahussain, 2014; Al-Zyoud, 2017). Table 1 shows the measurement summary of the CSR practice and its dimension.

Table 1. Measurement of CSR Practice and Dimension

Measurement of CSR Dimension	Author
Economic	Carroll (1991); Maignan (2001); Maigan and Ferrell (2004); Pérez and Del Bosque (2013); Ismail, Alias and Mohd Rasdi (2015)
Legal	Carroll (1991); Maignan (2001); Podnar and Golob (2007); Stanaland, Lwin, Murphy (2011); Pérez and Del Bosque (2013); Ismail, Alias and Mohd Rasdi (2015)
Ethical	Carroll (1991); Maignan (2001); Podnar and Golob (2007); Stanaland, Lwin, Murphy (2011); Pérez and Del Bosque (2013); Ismail, Alias and Mohd Rasdi (2015)
Philanthropic	Carroll (1991); Maignan (2001); Podnar and Golob (2007); Stanaland, Lwin, Murphy (2011); Pérez and Del Bosque (2013); Ismail, Alias and Mohd Rasdi (2015): Alvarado-Herrera, et.al (2017).

2.2. Community Well-being Concepts

Communities comprise people who care about one another, co-exist and interact every day (Flint, Luloff and Finley, 2008). That is, society emerges through social interaction. A community may be based on a place (e.g. warehouse, morgue) or determined by interest (Murphy, 2007). For a society based on a place, welfare is often understood as the physical environment, where the welfare dimension is proven and includes the social dimensions (i.e. psychology, culture and spiritual), economics and nature (Christakopoulou, Dawson and Gari, 2001). The City of Calgary (2010) explained that CWB incorporates the economic, social and physical well-being. Furthermore, Murphy (2010) and Hart (1999) argued that CWB is a conceptual framework that incorporates the social, economic, environmental, cultural and political dimensions identified by individuals and communities. Lee and Kim (2015) also defined CWB as a combination of several domain factors, such as social, economic, cultural, environmental and political. Table 2 shows the measurement summary of CWB.

Table 2. Measurement of the CWB dimension

Dimension/Indicator Measurement	Author
Economic Empowerment Dimension	
Income sufficiency	Cristakopoukalis, Dawson and Gari (2001); Ramsay and Smit (2002); Sirgy, Widgery, Lee, Yu (2010); City of Calgary (2010); Forjaz *et al*. (2011); Marton and Edwards (2012); McCrea, Walton and Leonard (2014); Walton, McCrea and Leonard (2014) : Kim and Lee (2015)
Financial work	
Resilient dynamis	
Local economic	
Employment, business opportunities and economy	
Social Dimension	
Personal safety, community spirit and cohesion, trust, participation, social interaction, neighbourhood	Cristakopoukalis, Dawson and Gari (2001); Ramsay and Smit (2002); Cuthill (2002); Stedman, Parkins and beckley (2005); McCrea, Walton and Leonard (2014); Walton, McCrea and Leonard (2014); Kim and Lee (2015)
Social interaction, family and home	Sirgy, Widgery, Lee, Yu (2010); Pope and Zhang (2010)
Environmental Dimension	
Environmental quality	Cristakopoukalis, Dawson and Gari (2001); Cuthill (2002); Salvaris and Wiseman (2004); Wiseman and Brasher (2008); Sirgy, Widgery, Lee, Yu (2010); Forjaz *et al*. (2011); McCrea, Walton and Leonard (2014); Walton, McCrea and Leonard (2014); Kim and Lee (2015)
Appearance, climate, park	
Environment	
Environmental quality and sustainability	
Green spaces, transportation, air and energy quality	
Political Dimension	

Decision-making process	Cristakopoukalis, Dawson and Gari (2001); Sirgy, Widgery, Lee, Yu (2010); Marton and Edwards (2012); McCrea *et al.* (2014); Pope and Zhang (2010); Wiseman, J.; Brasher, K. 2008; McCrea, Walton and Leonard (2014); Walton, McCrea and Leonard (2014); Kim and Lee (2015)
Political leadership and governance	
Democratic and engaged communities	
Decision-making and citizen's voice	
Politics	
Health Dimension	
Health service	Ramsey and Smit (2002); Etches, Frank, Ruggiero, Manuel (2006); Wiseman, J.; Brasher, K. 2008; Sirgy, Widgery, Lee, Yu (2010); Marton and Edwards (2012); McCrea, Walton and Leonard (2014); Walton, McCrea and Leonard (2014);
Physical and psychological health	
Services and Facilities Dimension	
Built environment services and facilities	Cristakopoukalis, Dawson and Gari (2001); Sirgy, Widgery, Lee, Yu (2010); Forjaz *et al.* (2011); Marton and Edwards (2012); McCrea, Walton and Leonard (2014); Walton, McCrea and Leonard (2014);
Education	
Transportation and traffic	
Community services	
Sustainable built and natural environment	
Services and facilities	
Appearance of built environment infrastructure, including roads	

2.3. Proposed Research Models

A well-implemented CSR is expected to create a positive impact on CWB (Kotler and Lee, 2005) and build stakeholder relationships (Knox, Maklan, and French, 2005). The effects of CSR are measured on the basis of Carroll's pyramid model (1991). In this case, the economic, legal, ethical, and philanthropic dimensions are used to measure the CSR dimensions that have been reported (e.g., Crespo and Del Bosque, 2005; Pérez and Del Bosque, 2013; Ismail, Alias and Mohd Rasdi, 2015). For the CWB dimensions, we relied on collaborations of previous researchers, such as Walton, McCrea, and Leonard (2014); McCrea, Walton, and Leonard (2014); and Kim and Lee (2015). The CWB dimensions are economic empowerment, social, environment, political, health, services, and facilities. Figure 1 presents the proposed conceptual model.

CSR affects community development. Ismail, Alias, and Mohd Rasdi (2015) determined that the majority of CSR-participating corporations had implemented CSR programs from the first decade of the millennium and had their core businesses in diverse sectors. Education-related activities formed the dominant type of CSR contribution. Brew, Junwu, and Addae-Boateng (2015) described CSR activities as related to health, education, community aid, and livelihood. Degie and Kebede (2017) explained that CSR has become an important interface between government and local communities and can be exemplary because it demonstrates that business corporations have the capability to address the pressing needs of communities. Degie and Kebede (2017) also showed that the CSR practice of companies improve the capability of a community and dimension of CWB. Al-Zyoud (2017) indicated that ethical and philanthropic influence in CSR significantly affects sustainability development. Similarly, Sarmila et al. (2015) concluded that a CSR project contributes to the economic welfare of the people through employment opportunities, sources of income, and asset financing. Moreover, Rudito (2014) reported that the CSR practice through community development indicates a positive change in the economic and sustainability aspects. Thus, previous research has shown that direct and indirect CSR practices contribute to CWB. Therefore, the following hypotheses have been developed on the basis of the literature review and research framework:
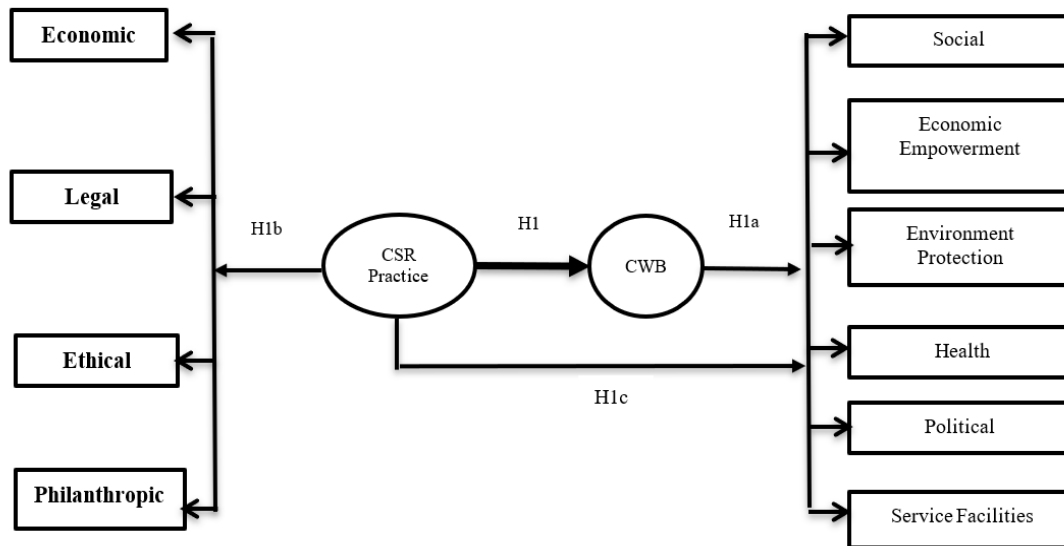
Figure 1. Proposed model of the study

Note: CSR: Corporate social responsibility
CWB: Community well-being

H1:   A positive and direct significant relationship exists between CSR practice and CWB.
H1a: A positive and significant relationship exists between CWB dimensions (economic empowerment, social, environment, political, health, services, and facilities) and CWB.
H1b: A positive and significant relationship exists between the dimensions (economic, legal, ethical, and philanthropic) and practice of CSR.
H1c: A positive and indirect significant relationship exists between CSR practice and CWB dimensions (economic empowerment, social, environment, political, health, services, and facilities).

3.   Conclusion

The measurement of the CSR dimensions in the adoption of the CSR pyramid is expected to be the standard for companies and contribute to the enhancement of the welfare of society. This measurement is important for the sustainability of the nickel industry of Indonesia and in gaining support from stakeholders, particularly from the community. In the future, the implementation of CSR in the nickel mining companies in Indonesia can improve the CWB. The companies can plan for social, economic, and environmental improvements. This study was also conducted on the basis of the proposed conceptual model, which is a new model based on previous research. In addition, this CSR model analyzes the effects of CSR on CWB and illustrates the contribution of the CSR dimension to CWB. This study is expected to provide a valid and reliable instrument and structural relationship model for CSR practice and CWB. The findings of this study can benefit and contribute to the academe and the industry, particularly to community empowerment practitioners, governments, and NGOs. Generally, the proposed model and research tool can serve as a benchmark and reference source for future research. As a future research agenda, the authors should evaluate the structural relationship between CSR practice and CWB in the Indonesian nickel mining industry.

Reference

Achua, J.K.; Utume, D. A. 2015. Corporate social responsibility practices in Nigerian mining industry: Host communities' perspectives, *Sustainability After Rio*: 141-160. https://doi.org/10.1108/S2043-052320150000008007

Alvarado -Herrera, A.; Bigne, E.; Aldas-Manzano, J.; Curras-Perez, R. 2017. A scale for measuring consumer perceptions of corporate social responsibility following the sustainable development paradigm, *Journal of Business Ethics* 140(2): 243-262. https://doi.org/10.1007/s10551-015-2654-9

Al-Zyoud, I. 2017. Impact of Corporate Social Responsibility Implementation in Jordanian Public Shareholding Companies on Sustainable Development, *Asian Social Science* 13(2): 94. https://doi.org/10.5539/ass.v13n2p94

Asmeri, R.; Alvionita, T.; Gunardi, A. 2017. CSR disclosures in the mining industry: Empirical evidence from listed mining firms in Indonesia, *Indonesian Journal of Sustainability Accounting and Management* 1(1), 16-22. https://doi.org/10.28992/ijsam.v1i1.23

Basu, K.; Palazzo, G. 2008. Corporate social responsibility: A process model of sensemaking, *Academy of management review* 33(1): 122-13. https://doi.org/10.5465/amr.2008.27745504

Beal, B.D. 2013. *Corporate social responsibility: Definition, core issues, and recent developments*: June 5. Sage Publications.

Brew, Y.; Junwu, C.; Addae-Boateng, S. 2015. Corporate social responsibility activities of mining companies: The views of the local communities in Ghana, *American Journal of Industrial and Business Management* 5(06): 457. http://dx.doi.org/10.4236/ajibm.2015.56045

Carroll, A. B.1991. The pyramid of corporate social responsibility: Toward the moral management of organizational stakeholders, *Business horizons* 34(4): 9-48.

Carroll, A. B.; Buchholtz, A. K. 2014. *Business and society: Ethics, sustainability, and stakeholder management*. Nelson Education.

Carroll, A.B.; Shabana, K.M. 2010. The business case for corporate social responsibility: A review of concepts, research and practice, *International journal of management reviews* 12(1): 85-105. https://doi.org/10.1111/j.1468-2370.2009.00275.x

Choi, Y.; Yu, Y. 2014. The influence of perceived corporate sustainability practices on employees and organizational performance, *Sustainability* 6(1): 348-364. https://doi.org/10.3390/su6010348

Christakopoulou, S.; Dawson, J.; Gari, A. 2001. The community well-being questionnaire: Theoretical context and initial assessment of its reliability and validity, *Social Indicators Research* 56(3): 319-349. https://doi.org/10.1023/A:1012478207457.

City of Calgary. 2010. *Indices of community well-being, 2006 for Calgary Neighborhoods*. Calgary: Alberta.

Corral, Melanie D.; Earle, Jared L. 2009. *Gold Mining: Formation and Resources Estimation, Economics and Environmental Impact*. New York: Nova Science Publishers.

Crespo, A. H.; Del Bosque, I. R. 2005. Influence of corporate social responsibility on loyalty and valuation of services, *Journal of business ethics* 61(4): 369-385. https://doi.org/10.1007/s10551-005-5841-2

Cuthill, M. 2002. Coolangatta: A portrait of community well-being, *Urban Policy and Research* 20(2): 187-203. https://doi.org/10.1080/08111140220144489

Dahlsrud, A. 2008. How corporate social responsibility is defined: an analysis of 37 definitions, *Corporate social responsibility and environmental management* 15(1): 1-13. https://doi.org/10.1002/csr.132

Davis, K.; Blomstrom, R. L. 1975. *Environment and responsibility*. Business and Society, New York: McGraw-Hill

Degie, B.; Kebede, W. 2019. Corporate social responsibility and its prospect for community development in Ethiopia, *International Social Work* 62(1): 376-389. https://doi.org/10.1177/0020872817731148

Deigh, L.; Farquhar, J.; Palazzo, M.; Siano, A. 2016. Corporate social responsibility: Engaging the community, *Qualitative Market Research: An International Journal* 19(2), 225-240. https://doi.org/10.1108/QMR-02-2016-0010

El-Garaihy, W. H.; Mobarak, A. K. M.; Albahussain, S. A. 2014. Measuring the impact of corporate social responsibility practices on competitive advantage: A mediation role of reputation and customer satisfaction, *International Journal of Business and Management* 9(5):109. https://doi.org/10.5539/ijbm.v9n5p109

Elkington, J. 1994. Towards the Sustainable Corporation: Win-Win-Win Business Strategies for Sustainable Development, *California Management Review* 36(2): 90–100. https://doi.org/10.2307/41165746

Etches, V.; Frank, J.; Ruggiero, E. D.; Manuel, D. 2006. Measuring population health: a review of indicators, *Annul. Rev. Public Health* 27: 29-55. https://doi.org/10.1146/annurev.publhealth.27.021405.102141

Flint, C. G.; Luloff, A. E.; Finley, J. C. 2008. Where is "community" in community-based forestry, *Society and Natural Resources* 21(6): 526-537. https://doi.org/10.1080/08941920701746954

Forjaz, M.J.; Prieto-Flores, M.E.; Ayala, A.; Rodriguez-Blazquez, C.; Fernandez-Mayoralas, G.; Rojo-Perez, F.; Martinez-Martin, P. 2011. Measurement properties of the Community Well-being Index in older adults", *Quality of Life Research* 20(5): 733–743. https://doi.org/10.1007/s11136-010-9794-2

Freeman, R. E. 1984. *Strategic Management: A Stakeholder Approach*. Pitman: Boston.

Frynas, J.G. 2009. Corporate social responsibility in the oil and gas sector. *Journal of World Energy Law and Bisness* 2(3): 178-195. https://doi.org/10.1093/jwelb/jwp012

Gaither, B. M.; Austin, L.; Schulz, M. 2018. Delineating CSR and social change: Querying corporations as actors for social good. *Public Relations Inquiry* 7(1): 45-61. https://doi.org/10.1177/2046147X17743544

Gangi, F.; Mustilli, M.; Varrone, N. 2019. The impact of corporate social responsibility (CSR) knowledge on corporate financial performance: evidence from the European banking industry, *Journal of Knowledge Management* 23(1), 110-134. https://doi.org/10.1108/JKM-04-2018-0267

Gómez-álvarez, Agustín, Valenzuela-García, Jesús L., Meza-Figueroa, Diana, de la O-Villanueva, Margarita, Ramírez-Hernández, Jorge, Almendariz-Tapia, Javier, & Pérez-Segura, Efrén. 2011. Impact of mining activities on sediments in a semi-arid environment: San Pedro River, Sonora, Mexico. *Applied Geochemistry* 26(12): 2101. https://doi.org/10.1016/j.apgeochem.2011.07.008

Gutti, B., Aji, M. M., Magaji, G. 2012. Environmental impact of natural resources exploitation in Nigeria and the way forward. *Journal of Applied Technology in Environmental Sanitation* 2(2): 95-102. https://doi.org/10.1142/S0219091516500181.

Hair Jr, J. F.; Sarstedt, M.; Ringle, C. M.; Gudergan, S. P. 2017. *Advanced issues in partial least squares structural equation modeling*. SAGE Publications.

Hart, M. 1999. Guide to Sustainable Community Indicators. Hart Environmental Data. Retrieved from: http://www.sustainablemeasures.com/

Hoi, C. K.; Wu, Q.; Zhang, H. 2018. Community social capital and corporate social responsibility. *Journal of Business Ethics* 152(3): 647-665. https://doi.org/10.1007/s10551-016-3335-z.

Hopkins M. 1998. *The Planetary Bargain: Corporate Social Responsibility Comes of Age*: Macmillan London.

ICW, 2017. *Indication of State Losses from Less Value of Export Nickel Ore (HS 2604) Period 2007 - 2015*. Indonesia: IndonesiaCoruption Watch

Iskandar, Z. R., Awang, A. H., Ramli, Z. (2019). An analysis of the community perceptions of well-being: Special reference to nickel mining and processing industry. *Management of Environmental Quality: An International Journal* 30(1): 211-226. https://doi.org/10.1108/MEQ-02-2018-0042

Ismail, M.; Alias, S. N.; Mohd Rasdi, R. 2015. Community as stakeholder of the corporate social responsibility program in Malaysia: outcomes in community development, *Social Responsibility Journal* 11(1), 109-130. https://doi.org/10.1108/SRJ-05-2013-0053

Jankalová, M.; Jankal, R. 2017. The assessment of corporate social responsibility: Approaches analysis, *Entrepreneurship and Sustainability Issues* 4(4): 441-459. https://doi.org/10.9770/jesi.2017.4.4(4)

Grozdanovic, M.; Bijelić, B.; Marjanovic, D. (2018). Impact assessment of risk parameters of underground coal mining on the environment. *Human and Ecological Risk Assessment: An International Journal*, *24*(4), 1003-1015. https://doi.org/10.1080/10807039.2017.1405339

Krejcie, R. V.; Morgan, D. W.1970). Determining sample size for research activities. *Educational and psychological measurement*, *30*(3), 607-610. https://doi.org/10.1177/001316447003000308

Kitula, A. G. N. 2006. The environmental and socio-economic impacts of mining on local livelihoods in Tanzania: A case study of Geita District, *Journal of Cleaner Production* 14 (2006): 405-414. https://doi.org/10.1016/j.jclepro.2004.01.012

Khoury, G.; Rostami, J.; Turnbull, P. L.1999. *Corporate social responsibility*: Turning words into action. Conference Board of Canada.

Knox, S.; Maklan, S.; French, P. 2005. Corporate social responsibility: Exploring stakeholder relationships and programme reporting across leading FTSE companies, *Journal of Business Ethics* 61(1) 7-28. https://doi.org/10.1007/s10551-005-0303-4.

Kotler, P.; Lee, N. 2005. Best of breed: When it comes to gaining a market edge while supporting a social cause,"corporate social marketing" leads the pack. *Social Marketing Quarterly* 11(3-4): 91-103. https://doi.org/10.1080/15245000500414480

Kotler, P.; Saliba, S.; Wrenn, B.1991. *Marketing management: Analysis, planning, and control: Instructor's Manual*: Prentice hall.

Lane, A. B.; Devin, B. 2018. Operationalizing stakeholder engagement in CSR: A process approach, *Corporate Social Responsibility and Environmental Management 25*(3): 267-280. https://doi.org/10.1002/csr.1460

Lee, C. K.; Kim, J. S.; Kim, J. S. 2018. Impact of a gaming company's CSR on residents' perceived benefits, quality of life, and support. *Tourism Management 6*4: 281-290. https://doi.org/10.1016/j.tourman.2017.09.002

Lee, S. J.; Kim, Y. 2015. Searching for the meaning of community well-being. In *Community well-being and community development*. Springer, Cham: 9-23. https://doi.org/10.1007/978-3-319-12421-6_2

Leonard, L. 2017. Examining environmental impact assessments and participation: the case of mining development in Dullstroom, Mpumalanga, South Africa. *Journal of Environmental Assessment Policy and Management 19* (01). https://doi.org/10.1142/S1464333217500028

Leonard, L., Lebogang, T. 2018. Exploring the impacts of mining on tourism growth and local sustainability: The case of Mapungubwe Heritage Site, Limpopo, South Africa. *Sustainable Development 26*(3): 206-216. https://doi.org/10.1002/sd.1695

Maignan, I. 2001. Consumers' perceptions of corporate social responsibilities: A cross-cultural comparison, *Journal of Business Ethics* 30(1):57-72. https://doi.org/10.1023/A:1006433928640.

Maignan, I.; Ferrell, O. C. 2004. Corporate social responsibility and marketing: An integrative framework, *Journal of the Academy of Marketing Science* 32(1):3-19. https://doi.org/10.1177/0092070303258971

McCrea, R.; Walton, A.; Leonard, R. 2014. A conceptual framework for investigating community wellbeing and resilience. *Rural Society*, 23(3): 270-282. https://doi.org/10.1080/10371656.2014.11082070

Measham, T. G., Haslam Mckenzie, F., Moffat, K., Franks, D. M. 2013. An expanded role for the mining sector in Australian society?. *Rural Society*, 22(2): 184-194. https://doi.org/10.5172/rsj.2013.22.2.184

Moser, C. A.; Kalton, G. (2017). *Survey methods in social investigation*. London: Routledge.

Murphy, B. L. 2007. Locating social capital in resilient community-level emergency management. *Natural Hazards* 41(2): 297-315. https://doi.org/10.1007/s11069-006-9037-6.

Murphy, B.L. 2010. *Community Well-Being: An Overview of the Concept*. Retrieved from: http://nwmo.ca/uploadsmanaged

Muthuri, J. N.; Gilbert, V. 2011. An institutional analysis of corporate social responsibility in Kenya. *Journal of business Ethics* 98(3): 467-483. https://doi.org/10.1007/s10551-010-0588-9

Narwal, M. 2007. CSR initiatives of Indian banking industry, *Social Responsibility Journal* 3(4): 49-60. https://doi.org/10.1108/17471110710840233

Pérez, A.; Del Bosque, I. R. 2013. Measuring CSR image: three studies to develop and to validate a reliable measurement tool. *Journal of business ethics* 118(2): 265-286. https://doi.org/10.1007/s10551-012-1588-8

Phiri, O.; Mantzari, E.; Gleadle, P. 2019. Stakeholder interactions and corporate social responsibility (CSR) practices: Evidence from the Zambian copper mining sector. *Accounting, Auditing and Accountability Journal* 32(1): 26-54. https://doi.org/10.1108/AAAJ-04-2016-2540

Podnar, K. Golob, U. 2007. CSR expectations: the focus of corporate marketing. *Corporate Communications: An International Journal* 12(4): 326-340. https://doi.org/10.1108/13563280710832498

Pope, J.; Zhang, W. 2010. *Indicators of community strength at the local government area level in Victoria 2008*. Victoria: Department of Planning and Community Development.

Ramsey, D.; Smit, B. 2002. Rural community well-being: models and application to changes in the tobacco-belt in Ontario, Canada, *Geoforum* 33(3): 367-384. https://doi.org/10.1016/S0016-7185(02)00008-8

Rhee, Y. P.; Park, C.; Petersen, B. 2018. The Effect of Local Stakeholder Pressures on Responsive and Strategic CSR Activities, *Business and Society*. https://doi.org/10.1177/0007650318816454

Roberts, R. W. 1992. Determinants of corporate social responsibility disclosure: An application of stakeholder theory. *Accounting, organizations and society*, 17(6): 595-612. https://doi.org/10.1016/0361-3682(92)90015-K

Rudito, B. 2014. The improvement of community economy as impact of corporate social responsibility program: A case study in Pengalengan, Bandung, West Java, Indonesia, *Procedia-Social and Behavioural Sciences* 164: 471-476. https://doi.org/10.1016/j.sbspro.2014.11.104

Sarmila, M.S.; Zaimah, R.; Lyndon, N.; Hussain, M.Y.; Awang, A.H. 2015. Local community economic wellbeing through CSR project, *Mediterranean Journal of Social Sciences* 6(4): 79. https://doi.org/10.5901/mjss.2015.v6n4s3p79

Scalia, M., Barile, S., Saviano, M., & Farioli, F. 2018. Governance for sustainability: a triple-helix model. *Sustainability Science*, *13*(5), 1235-1244. https://doi.org/10.1007/s11625-018-0567-0

Sirgy, M.J.; Widgery, R.N.; Lee, D.J.; Yu, G.B. 2010. Developing a measure of community well-being based on perceptions of impact in various life domains. *Social Indicators Research,* 96(2): 295–311. https://doi.org/10.1007/s11205-009-9479-9

Stanaland, A. J.; Lwin, M. O.; Murphy, P. E. 2011. Consumer perceptions of the antecedents and consequences of corporate social responsibility. *Journal of Business Ethics* 102 (1): 47-55. https://doi.org/10.1007/s10551-011-0904-z

Stedman, R. C.; Parkins, J. R.; Beckley, T. M. 2005. Forest dependence and community well-being in rural Canada: variation by forest sector and region. *Canadian Journal of Forest Research* 35(1): 215-220. https://doi.org/10.1139/x04-140

Taneja, S.S.; Taneja, P.K.; Gupta, R.K. 2011. Researches in corporate social responsibility: A review of shifting focus, paradigms, and methodologies. *Journal of Business Ethics* 101(3):343-364. https://doi.org/10.1007/s10551-010-0732-6

Walton, A.; McCrea, R.; Leonard, R. 2014. *CSIRO survey of community wellbeing and responding to change*: Western Downs region in Queensland.

Weaver, P. P., Billett, D. S., & Van Dover, C. L. 2018. Environmental risks of deep-sea mining. In *Handbook on Marine Environment Protection* (pp. 215-245). Springer, Cham. https://doi.org/10.1007/978-3-319-60156-4_11

Wiseman, J.; Brasher, K. 2008. Community well-being in an unwell world: Trends, challenges, and possibilities, *Journal of Public Health Policy* 29(3): 353-366. https://doi.org/10.1057/jphp.2008.16

Zhao, Y., Zhang, H., Cao, L., Zhang, C., Bohlscheid, H. 2009. Mining both positive and negative impact-oriented sequential rules from transactional data. In *Pacific-Asia Conference on Knowledge Discovery and Data Mining:* 656-663. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-01307-2_65

Appendix - Questionnaire Design

The questionnaire designed for this study used the Likert-type scale of responses. The respondents were asked to rank their answers to 1= strongly disagree to 5= strongly agree.

CSR Dimensions and Item

CSR Dimensions and Item
Economic Responsibility
It is important for each company to perform in a manner consistent with maximizing its profits.
It is important for each company to be committed to being as profitable as possible.
It is important for each company to maintain a strong competitive position.
It is important for each company to maintain a high level of operating efficiency.
It is important that a successful firm be defined as one that is consistently profitable
Legal Responsibility
It is important for each company to perform in a manner consistent with expectations of government and law
It is important for each company to comply with various federal, state, and local regulations
It is important for each company to be a law-abiding corporate citizen.
It is important that a successful firm be defined as one that fulfils its legal obligations.
It is important for each company to provide goods and services that at least meet minimum legal requirements
Ethical Responsibility
It is important for each company to perform in a manner consistent with expectations of societal morale and ethical norms
It is important for each company to recognize and respect new or evolving ethical/moral norms adopted by society.
It is important for each company to prevent ethical norms from being compromised in order to achieve corporate goals.
It is important that good corporate citizenship be defined as doing what is expected morally or ethically
It is important to recognize that corporate integrity and ethical behaviour go beyond mere compliance with laws and regulations.
Philanthropic Responsibility
It is important for each company to perform in a manner consistent with the philanthropic and charitable expectations of society
It is important for each company to assist the arts and cultural activities.
s important that managers and employees to participate in voluntary and charitable activities within their local communities
It is important for each company to provide assistance to private and public educational institutions.
It is important for each company to assist voluntarily those projects that enhance a community's "quality of life".

Source: Adapted from Ismail, Alias and Mohd Rasdi (2015)

CWB Dimensions and Item

Dimensions and Item	Reference
Social-Culture	
Every member of the community is more willing to help with each other	McCrea, Walton and Leonard (2014); Iskandar, Hair and Zaimah (2018).
Every member of the community has an increasingly friendly relationship	
Every member of society is working together if there is a serious problem	
You often visit someone's house	
Economic Empowerment	Cristakopoukalis, Dawson and Gari, (2001).
The CSR presence of the company led to reduced unemployment in the village	
The collection of businesses in this village is more independent	Sirgy, Widgery, Lee, Yu (2010); McCrea, Walton and Leonard (2014); Iskandar, Hair and Zaimah (2018).
The strengthening of the local economy reduces the crime in this village	
My income increased to finance life in this village.	
My income is more sufficient to finance your lifestyle	

Community rapport program adds farmers / fishermen / industry in this village	
Commerce advantage / industry community in the village is better due to the support of capital and equipment from the company	
Environment	Cristakopoukalis, Dawson and Gari (2001);
The quality of the ground water is getting better for this village	Cuthill (2002);
The quality of river water is good for this village	Salvaris and Wiseman (2004);
The quality of the marine ecosystem is preserved for the future	Wiseman and Brasher (2008);
Noise due to the company operations is increasingly reduced in this village	Sirgy, Widgery, Lee, Yu (2010);
Dust and gas due to the company operations increasingly reduced in this village	Forjaz *et al*. (2011);
The life of flora fauna has improved in this village	Walton, McCrea and Leonard (2014); Kim and Lee (2015); Iskandar, Hair and Zaimah (2018).
Health	
The community of this village who suffer from serious illness is getting less.	
My home environment is getting more comfortable	McCrea, Walton and Leonard (2014);
I feel optimistic about the village community's cleanliness in the future.	Marton and edwards (2012);
I feel relaxed and no longer stressful	Ramsey and Smit (2002);
I succeeded in overcoming my health problems	Iskandar, Hair and Zaimah (2018).
The health facilities in this village are getting better	
The student's health fitness in this village is getting better	
Education	
Students in this village are more comfortable learning	
Students in this village showed better performance	Iskandar, Hair and Zaimah (2018).
The more students in this village continue their study	
The student attendance in this village is getting better	
Services and Facilities/Infrastructure	
Traffic in this village is more smoothly and regularly	
Access to public transport in this village is getting easier	
The road accident is decreases from time to time	Walton, McCrea and Leonard (2014);
The community in this village who works outside the village is getting easier and faster	Iskandar, Hair and Zaimah (2018).
The farmers' products are more easily transported out to market	
Goods are getting easily transported into this village	
The presence of community members at mosque is getting better	

322

Iskandar Zainuddin RELA is a senior lecturer at the Extension Agriculture, Faculty of Agricultre, University of Halu Oleo. Field of expertise and research interest in Corporate social Responbility and community well-being.
ORCID ID:https://orcid.org/0000-0001-9645-5170

Abd Hair AWANG an Associate Professor in Development Studies at Faculty of Social Sciences and Humanities, Universiti Kebangsaan Malaysia (UKM).
ORCID ID: https://orcid.org/0000-0002-0837-7975

Zaimah RAMLI is a senior lecturer at the Development Studies, Faculty of Social Sciences and Humanities, Universiti Kebangsaan Malaysia. Her field of expertise and research interest is family economics and management.
ORCID ID:https://orcid.org/0000-0002-0939-5489

Muhammad RUSDAN is as researchers and practitioners in the field of CSR and community empowerment from PT Antam.
ORCID ID:https://orcid.org/0000-0003-0948-2707

Musadar MAPPASOMBA is a senior lecturer at the Extension Agriculture, Faculty of Agricultre, University of Halu Oleo. His field of expertise and research interest in community development.
ORCID ID:https://orcid.org/0000-0003-3684-9738

Anas NIKOYAN is a senior lecturer at the Extension Agriculture, Faculty of Agricultre, University of Halu Oleo. His field of expertise and research interest in agriculture and community development.
ORCID ID:https://orcid.org/0000-0002-5168-1892

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

_____

Publisher
http://jssidoi.org/esc/home

THE ROLE OF FIRM'S MOBILE APPLICATIONS IN DEVELOPING BRAND'S EQUITY

Mohammad Fahmi Al-Zyoud

Al-Ahliyya Amman University, Business School, Marketing Departement Al-Saro, Al-Salt, Balqa Governorate, Amman, Jordan

E-mail: m.alzyoud@ammanu.edu.jo

Abstract. With the appearance and wide spread of smart phones, individuals have become attached to their mobile phones in order to run their lives, it included texting, calling, calendar, GPS, and appointments. Organizations have exploited the use of smartphones in developing mobile applications in which a user can get the service of the organization and at the same time be exposed to all its marketing and promoting campaigns. Current study aimed at examining the influence of mobile applications on brand equity determinants (Brand Awareness, Perceived Quality, Brand Association and Brand Loyalty) from the perspective of mobile application users in Jordan. Results of study indicated that, mobile applications have a positive influence on brand equity and it managed to be a strong branding platform for marketers in general. In addition to that, results indicated that among the variables of brand equity, brand awareness was the most influenced by smartphones applications. Study recommended to carry out a research that examines the influence of mobile applications on health care performance and how can health care services be eased out for patients who don't have the ability to move from place to another like seniors and handicapped.

Keywords: smartphone applications; brand equity; mobile marketing; brand awareness; perceived quality; brand association; brand loyalty

1. Introduction

The use of cellphones and mobile phones has risen to be a main tool for marketing and promoting for services and goods, hence drawing colossal enthusiasm from both marketers and consumers.According to Masika (2013), mobile phone users presently remain at 6 billion all around the world. Ordinary phones shape the dominant part of these telephones while advanced mobile phones (smart phones) remain at around 1 billion. In this way, cell phones present the best chance of every connected device (Notebooks, desktops, mobile phones, tablets, and ultra-mobile Portable Computers) as an advertising stage. The Mobile telephone shows a few marketing correspondence tool including yet not restricted to Mobile inquiry, Mobile video, Mobile photos and Mobile informing. One road of versatile marketing that has gotten critical consideration is Mobile messaging through the

short message service (SMS) marketing. SMS is an application that enables mobile users to send an instant message of up to 160 characters between cell phones. Sending short messages is likewise regularly known as "messaging" or "content informing". To date, SMS has turned into the most prevalent of every versatile application. In 2010, the quantity of instant messages sent all inclusive achieved 6.1 trillion, or around 600,000 instant messages are sent each second Masika (2013). From the part of business, an ongoing review found that the level of mobile users in European nations who got SMS ad in 2007 moved toward about 100 %.

2. Literature Review

A mobile application – generally referred to as APP – is a computerized software that designed to be used using a smart phone or a tablet. Those applications are normally used in order to get the same service that can be reached through using them on PCs. The idea of mobile application is now becoming more and more apparent given that the number of people using smart phones is increasing on daily bases (King and Raja, 2012).

Lee et al. (2004) argues that a mobile app can be referred to as a software program created for cell phones, for example, cell phones and tablets. They transform cell phones into small-scale powerhouses of capacity and fun. A few gadgets come preloaded with some versatile applications cordiality of their producers or the portable specialist organizations with which they are related (for instance, Verizon, AT&T, T-Mobile, and so on.), yet numerous more applications are accessible through gadget particular application stores (Schierz et al., 2010). Washburn (2011) states that the reasons for these applications run the array, from utility, efficiency, and route to stimulation, games, wellness, and pretty much any others possible. Internet based life is a standout amongst the most prevalent fields of versatile application improvement and reception. Actually, Facebook was the most broadly utilized application in 2017 over all stages.

Numerous online substances have both versatile sites and portable applications (Pavlovaite, and Griesiene, (2019). All in all, the distinction lies in reason: An application is generally littler in scope than a portable site, offers greater intuitiveness, and displays more particular data in a configuration that is simple and natural to use on a cell phone. A versatile application designer makes an application particularly for the working framework in which it will run. For instance, versatile applications for the iPad are bolstered by Apple's iOS, yet not Google's Android. An Apple application cannot keep running on an Android telephone, and the other way around. Frequently, designers make a variant for each; for instance, a versatile application in the Apple Store may have a partner in Google Play (Rubin et al., 2015).

Mobile applications appreciate relatively lasting network also, the capacity to trade data with their own particular backend also, other outsider servers. This paper demonstrates that much of this correspondence does not convey any unmistakable incentive to the application's client: incapacitating it leaves the conveyed application encounter totally unblemished. However, this secretive correspondence accompanies costs, for example, potential security breaks, transfer speed charges, control utilization on the gadget, and the unsuspected nearness of proceeded with correspondence between the gadget and remote associations. Truth be told, we saw that a few prevalent applications, e.g., Walmart and Twitter, produce administrations that secretively speak with remote servers even at the point when the application itself is latent and the client is unconscious that the brought forth benefits are running out of sight (Priyantha et al., 2001). According to Florido-Benítez and Martínez (2015), mobile applications are by and large progressively utilized in cell phones and tablets to get to news, amusements, excitement, climate and other data. Extensive airplane terminals are exploiting the solidification of cell phones in the 21st century to make applications for marking and correspondence. These applications have prompted the production of another promoting outlet, portable marketing, that can be utilized as a business specialized instrument. Over the most recent couple of years, this advertising model has united itself into an item as opposed to a simple correspondence instrument because of its multi usefulness, which contributes increased the value of the substance of the administrations advertised. Portable marketing likewise adds to larger amounts of fulfillment

among airplane terminal customers. In any case, for versatile marketing foundation to make long haul progress, it must give advantages to air terminals and carriers through the portable applications. New data innovations made new media – cell phones, by which can be applied mobile marketing. In his paper, Joshi (2013) distinguishes cell phones as a critical development whose effect on the organization most likely will not stop soon. To accentuate their significance and vital part in business, Joshi (2013) calls cell phones "vital development". Since cell phones are in every case near their proprietors, they make enthusiastic effect. Dushinski (2009) in his paper characterizes mobile marketing as a progressive device for associating organizations with every one of their customers through their cell phones in the ideal time, on a correct place and with proper direct message. Becker and Arnold (2010) stress meaning of mobile marketing which have been given from Mobile Marketing Association, which says that mobile marketing is an arrangement of methods that empowers correspondence with organizations target gathering of people on intuitive and applicable way through cell phones. Likewise, mobile marketing is another marketing channel, which has been made amid the advancement of online business. In spite of the fact that it is conceivable to connect target bunches by means of cell phones, Tanakinjal et al. (2011) express that it is critical to attempt and investigate the conceivable outcomes to influence it to work. As indicated by Andrews et al. (2012), portable promoting is any type of marketing correspondence that has been utilizing cell phones amid the making of potential chances and advantages for clients, what incorporates area based versatile administrations and administrations for the conveyance of portable substance. Advertising specialists concur with the way that exercises that have been going ahead with the cell phones, in the most recent decade, had a huge influence on mobile marketing and on plan for buy of potential clients later on (Chinomona I Sandada, 2013). The same number of individuals compare the term of advertising with advancement, it likewise occurs with the term of portable marketing and versatile advancement, what is without a doubt off-base. Tanakinjal et al. (2011) clarify the distinction between these two terms. Versatile marketing is a driver and an establishment for the trading of substance and direct reaction, while portable promoting is type of a message, which has been sent by means of cell phone. Mobile marketing is a type of correspondence with existing and potential customers. Premise of this correspondence has been improvement of media transmission, data and remote advancements. Mobile marketing does not lose the feeling of advertising but rather mirrors the inventiveness of marketing experts and their technique while result ought to be subjective and fruitful advertising correspondence between the organization and clients. Henceforth, versatile advancement is a piece of portable marketing and is one of its most critical exercises. Cell phones are claimed by one individual what empowers correspondence with a particular individual and message that has been sent to them is promptly accessible Hazlett (2011). Likewise, connection with the customers can be entirely unexpected for every customer, what is not the situation in different sorts of advertising (Dushinski, 2009). Due to the open doors given by versatile marketing, organizations can without much of a stretch incorporate into the trading of data with existing and potential clients, with the point of enhancing items. Organizations are progressively settling on portable promoting in view of the pattern and its hopeful projections (Smith, 2010).

Brand Equity

Brand equity is one of the most important aspects in marketing management. The term brand equity was brought into light by Farguhar (1989) who stated that brand equity has the ability to bring about an added value to the product. Keller (1993, p. 1) defined brand equity as *"the differential effect of brand knowledge on consumer response to the marketing of the brand",* Pullig (2008, p.1) on the other hand defined brand equity as *"the value of the brand in the market place".* Also, Severi and Ling (2013, p.125) defined brand equity as *"the marketing and financial values linked with a brand's strength in the market, including actual proprietary brand assets, brand name awareness, brand loyalty, perceived brand quality, and brand associations".*

According to Severi and Ling (2013) high brand value, a brand with high appreciations and acceptance, it implies that the brand can make a type of positive differential reaction in the commercial center. This can imply that your image is effortlessly conspicuous when experienced in promoting or seen on a yard sign. It can imply that your

image is one of the initial ones reviewed when a pertinent incite is utilized – "who might I call to talk about posting my home?" It could imply that people would pay a superior cost for your brand's putting forth. On account of a land exchange, people would pay a standard commission and feel as though they got an important great administration from an outstanding and confided in mark. It could imply that when somebody requests a referral, your image is the first that is prescribed to others. These are certain reactions to the brand – a promptly conspicuous brand, a brand that is reviewed rapidly and effortlessly when required, one that people will pay a top notch cost to gain, and a brand that is prescribed to others. These are on the whole attributes of a high value mark (Simon and Sullivan, 1993).On the other hand, Wood (2000) states that an attempt to characterize the connection amongst clients and brands created the term ``brand equity'' in the advertising literature. The idea of brand equity has been discussed both in the literature related to branding and marketing, and has featured the significance of having a long haul center inside brand management. Despite the fact that there have been critical moves by organizations to be key in how marks are dealt with, an absence of normal wording and theory inside and between disciplines perseveres and may impede correspondence. Brand equity, similar to the ideas of brand and included value has multiplied into different implications. Researchers have a tendency to characterize brand equity uniquely in contrast to advertisers, with the idea being characterized both as far as the connection amongst client and brand (customer arranged definitions), or as something that accumulates to the brand proprietor (organization situated definitions). Severi and Ling (2013) improves the assortment of methodologies, by giving an order of the distinctive implications of brand equity as: the aggregate estimation of a brand as a detachable resource when it is sold, or included on an accounting report; a proportion of the quality of customers' connection to a brand; a portrayal of the affiliations and convictions the buyer has about the brand. Piaralal and Mei (2015) noted that the term brand equity id constructed from multiple dimensions, which forms its meaning and influence. Those dimensions are:

Brand Awareness
According to Severi and Ling (2013, p.126) brand awareness is one of the most important dimensions of brand equity, and it refers to the *"durability of the brand that embedded in the customer memory"*.Djerv and Malla (2012, p.9) stated that brand awareness is the *"brand's ability to be recognized or recalled as a member of a certain product category or service"*. It is believed, that brand awareness plays a significant role in the process of decision making process within the clients due to the fact that it helps the brand being remembered in the mindset of the client specifically if they were the type of people who build their purchase decision based on brand, also it helps in forming the strength of the brand leading to greater loyalty and association (Awan and Rehman, 2014; Piaralal and Mei, 2015; Hashem, 2016).

Perceived Quality
The perceived quality is the element that determents the brand equity as appeared by Severi and Ling (2013). The authors defined perceived quality as *"the overall perception of customers about brilliance and quality of products or services in comparing with the rivalry offering"* (p.127). It is worth to mention here that the perceived quality differs from the quality of the product; perceived quality refers to the customer's emotional evaluation of the product, which can be unfair to use as a general evaluation of the product itself given that the emotional evaluation differs from a customer to another. In addition to that, perceived quality is considered to be a key factor in influencing the customer's decision-making process to purchase (Sprosen, 2014).

Brand Association
Low and Lamb (2000) defined brand association as the memorable characteristics, specifications and ideas that are memorable in the customers' mindset. Brand association can also refer to the set of items, description that makes the brand memorable for others (Gordon et al., 2016; French and Smith, 2013).

Brand Loyalty

This dimension is the core of the concept of brand equity as stated by Djerv and Malla (2012). If the customers buy the item just for its price, features or convenience, and without any interest in the name of the brand then the equity is very weak. On the other hand, if the customer buys a product for the brand, which – from customers' perspective – guarantees for them quality, convenience, good features and suitable prices then the equity is high. Generally speaking, customers who do not get what they paid for are usually customers without loyalty for the brand, and they are welling to change their mindset into another brand. In the case of loyalty, the prior experience of a customer is a must, a customer cannot be considered loyal or not if they haven't had the needed prior experience of the brand (Piaralal and Mei, 2015).

Aims

From the above argument, it can be seen that using mobile phones in marketing has become a main tool for marketers and organization launching from the fact that individuals are becoming attached to their mobiles. They manage a lot of stuff using mobiles this includes emails, calendars, appointments, games, texting and GPS. From that point, marketers have exploited that idea of being attached to mobiles and has worked on making it the main and most important marketing platforms on which a marketer guarantees the receiving of the marketing initiative to the users. With the wide spread use of smart phones, and the appearance of mobile applications marketers have also benefited from this concept through building an application that is able to give the service to the clients along with the marketing process. Many large corporations now have its own mobile application which using it from the client is almost as effective as visiting the organization itself or one of its service booths. That way, clients find that this process saves them time and efforts and at the same time increases the percentage of users and opens the gates wider for potential clients. Launching from a study by (Masika, 2013; Sprosen, 2014; Vikström and Zheng, 2013; Tetere, 2011) this study aimed at examining the influence of using mobile application in increasing the brand equity from the perspective of mobile applications users in Jordan.

Based on the aim above, current study determined on answering the following questions: How can mobile applications help in developing brand equity?

In order to answer the above questions, following model was built so as to determine the main hypotheses of study (Figure 1):
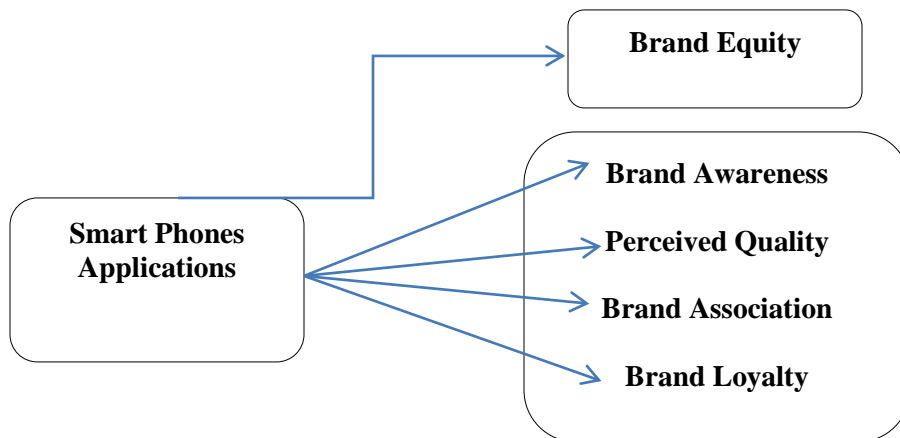
Figure 1. Study Model (Gunawardane et al., 2016; Masika, 2013; Trillo, 2017)

Based on the presented model above, the hypotheses of study will be the following:

Main Hypothesis:

H$_1$: Mobile applications have a statistically significant influence on brand equity from the perspective of smartphones users in Jordan

Sub-Hypotheses:

H$_{1a}$: Mobile applications have a statistically significant influence on brand awareness from the perspective of smartphones users in Jordan

H$_{1b}$: Mobile applications have a statistically significant influence on perceived quality from the perspective of smartphones users in Jordan

H$_{1c}$: Mobile applications have a statistically significant influence on brand association from the perspective of smartphones users in Jordan

H$_{1d}$: Mobile applications have a statistically significant influence on brand loyalty from the perspective of smartphones users in Jordan

2. Methods

Methodological Approach

In order to answer study questions and process the hypotheses of current study the author has chosen the quantitative approach. This approach gives a chance to researchers to apply their study on large numbers of individuals in order to get more dependable results which cover a large number of participants.

Tool of Study

The researcher developed a self-administered questionnaire which was distributed on the study sample in order to collect data. The questionnaire consisted of two main parts, the first took into perspective the demographic variables including (gender, age, education) while the other part consisted to statements regarding the study variables of brand equity and mobile applications in smartphones.

Population and Sample

The population of the study was formed of Jordanian consumers who use smartphones applications. The initial sample consisted of (700) individuals from malls, retail stores and commercial complexes in the Jordanian capital, Amman. The researcher was able to retrieve (520) properly filled questionnaires for analysis. The response rate of current study reached 74.2% which is a statistically approved rate.

3. Results

The empirical data obtained in the process of the research is explained in this section, figures, tables, graphs are used to facilitate such. In this results section we will examine demographic, sample, questionnaire analysis, hypothesis testing, and reliability testing.

Demographic Analysis

Table 1. Sample characteristics according to gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	285	54.8	54.8	54.8
	Female	235	45.2	45.2	100.0
	Total	520	100.0	100.0	

Table (1) highlighted the sample characteristics according to gender. It appeared through the analysis that 54.8% of individuals were males, while 45.2% of individuals appeared to be females. This indicates that males are into using mobile applications compared to females.

Table 2. Sample characteristics according to age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-22	79	15.2	15.2	15.2
	23-27	193	37.1	37.1	52.3
	28-32	161	31.0	31.0	83.3
	+33	87	16.7	16.7	100.0
	Total	520	100.0	100.0	

Table (2) presented the sample characteristics according to age. From the analysis, it appeared that the majority of the sample 37.1% was from the age range of (23-27) years old.In the 2nd rank came individuals within the age range of 28-32 years old forming 31% of the total sample.

Table 3. Sample characteristics according to education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BA	48	9.2	9.2	9.2
	MA	352	67.7	67.7	76.9
	PhD	120	23.1	23.1	100.0
	Total	520	100.0	100.0	

Table (3) presented the sample characteristics according to education. It appeared that the majority if the sample 67.7% held master degree compared to 23.1% who held PhD degree.

Table 4. Sample characteristics according to income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	250-500	114	21.9	21.9	21.9
	501-750	84	16.2	16.2	38.1
	751-1000	79	15.2	15.2	53.3
	1001-1250	111	21.3	21.3	74.6
	1251+	132	25.4	25.4	100.0
	Total	520	100.0	100.0	

Table (4) above described sample characteristics according to income, from the analysis, it appeared that the majority of the sample (25.4%) had an income range of +1251 JOD which is explained through the fact that most brands which builds its own applications are mostly above average when it comes to price.

Questionnaire Analysis

Table 5. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Smartphones Applications					
Smartphones application interacts with consumers and present the best service for them	520	1.0	5.0	3.877	.8846
Using my phone to get a service is much easier than visiting the company branch	520	1.0	5.0	3.860	.8918
I prefer using the brand app specially if it works offline	520	1.0	5.0	3.667	1.0978
I know about the promotions and adds from the app not the main website of the brand	520	1.0	5.0	3.727	.9847
I always depend on the application on my phone to know the latest promotions	520	1.0	5.0	3.569	1.0177
I have applications to all my favorite brands on my phone	520	1.0	5.0	3.567	.9472
Applications information don't match reality	520	1.0	5.0	3.600	1.0075
Brand Equity					
Brand Awareness					
I always follow my favorite brand on its application	520	1.0	5.0	3.573	1.0079
Weak brands don't have mobile application	520	1.0	5.0	3.458	1.0360
When there is an application I assume it is a powerful brand	520	1.0	5.0	3.540	.9866
I know the application of a certain brand as soon as I see its logo	520	1.0	5.0	3.508	.9696
Perceived Quality					
Good brands always have applications	520	1.0	5.0	3.617	.9545

I know the level of the brand from the number of individuals who downloaded the app	520	1.0	5.0	3.627	.9573
If the app works properly then the brand is the best	520	1.0	5.0	3.406	1.0042
Cheap brands can't afford mobile apps	520	1.0	5.0	3.517	.9755
Brand Association					
I get all the service I need from the application which makes me appreciate the brand more	520	1.0	5.0	3.519	.9969
All information I need are always on the app	520	1.0	5.0	3.048	1.1874
The application is always updated and gives me the latest promotions	520	1.0	5.0	3.062	1.2798
Most of the information I can get from the brand company can be attained through the application	520	1.0	5.0	3.069	1.1609
Brand Loyalty					
I prefer to stick to a certain brand as long as it has application	520	1.0	5.0	3.071	1.1108
I don't switch my brand if the application is helpful	520	1.0	5.0	3.050	1.4079
I prefer brands with mobile apps	519	1.0	5.0	3.318	.9751
Mobile apps are much easier	519	1.0	5.0	3.351	.9944
Valid N (listwise)	519				

According to table (5), it was seen that all of the questionnaire statements were positively received by the sample which was noted through their answers on the scale. The means of the statements scored higher than 3.00, which were seen to be a good indicator. This gives an indication that the sample individuals had a positive attitude towards statements of the questionnaire referring to the variables as positively received.

Table 6. Descriptive Statistics of Variables

	N	Minimum	Maximum	Mean	Std. Deviation
Smartphone applications	520	1.29	5.00	3.6953	.77397
Brand Awareness	520	1.00	5.00	3.5197	.84390
Brand Quality	520	1.00	5.00	3.5418	.82926
Brand Association	520	1.00	5.00	3.1745	.97027
Brand Loyalty	520	1.00	5.00	3.1952	.88139
Brand Equity	520	1.13	5.00	3.3584	.77014

It appeared from table (6) above that sample individuals had positive attitude toward variables of study. It is shown in the table that all variables scored higher than 3.00 as a mean, which a statistically accepted results and a good indicator of positive attitudes.

Reliability Test:

Through employing Cronbachs' alpha, a reliability test was carried out. Results of the reliability test indicated that all of the items scored higher than the value of (0.60) and they all have given the value of (0.953). This refers to the tool consistency of the study.

Hypotheses Testing

Main Hypothesis Testing (see Tables 7, 8, 9):
- ❖ **H$_1$**: Mobile applications have a statistically significant influence on brand equity from the perspective of smartphones users in Jordan

Table 7. Model Summary H1

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.758[a]	.575	.574	.50267

Table 8. ANOVA[a] H1

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	176.945	1	176.945	700.290	.000[b]
	Residual	130.885	518	.253		
	Total	307.829	519			

Table 9. Coefficients[a] H1

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.571	.108		5.302	.000
	smart	.754	.029	.758	26.463	.000

The main hypothesis (H1) was tested through multiple regression. Results indicated that R value reached (0.758) and the variables are correlated. With a T value of 26.463 at level 0.05 it can be said that results approved the influence of smartphones applications on brand equity.

Sub-Hypotheses Testing (see Tables 10, 11, 12)*:*
- ❖ **H$_{1a}$**: Mobile applications have a statistically significant influence on brand awareness from the perspective of smartphones users in Jordan

Table 10. Model Summary H$_{1a}$

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.789[a]	.622	.621	.51948

Table 11. ANOVA[a] H[1a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	229.821	1	229.821	851.616	.000[b]
	Residual	139.790	518	.270		
	Total	369.610	519			

Table 12. Coefficients[a] H[1a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.343	.111		3.080	.002
	smart	.860	.029	.789	29.182	.000

Looking at tables (10, 11, and 12) it can be seen that the 1st sub-hypothesis was tested through multiple regression. From the analysis it appeared that R value scored 0.789 and both variables were strongly correlated. In addition to that, the T value scored 29.182 at level 0.05 which accepts the hypothesis that smartphone applications positively influence brand awareness.

❖ **H[1b]**: Mobile applications have a statistically significant influence on perceived quality from the perspective of smartphones users in Jordan

Table 13. Model Summary H[1b]

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.684[a]	.468	.467	.60519

Table 14. ANOVA[a] H[1b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	167.184	1	167.184	456.471	.000[b]
	Residual	189.719	518	.366		
	Total	356.903	519			

Table 15. Coefficients[a] H[1b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.832	.130		6.421	.000
	smart	.733	.034	.684	21.365	.000

From testing hypothesis 1b, it can be seen that multiple regression scored an R value of 0.684 confirming the correlation between the variables. With a T value of 21.365 on level 0.05 it can be said that smartphones applications positively influences perceived quality of the brand (Tables 13, 14, 15).

❖ **H$_{1c}$**: Mobile applications have a statistically significant influence on brand association from the perspective of smartphones users in Jordan

Table 16. Model Summary H$_{1c}$

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.618[a]	.382	.381	.76326

Table 17. ANOVA[a] H$_{1c}$

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	186.828	1	186.828	320.696	.000[b]
	Residual	301.772	518	.583		
	Total	488.600	519			

Table 18. Coefficients[a] H$_{1c}$

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.310	.163		1.896	.058
	smart	.775	.043	.618	17.908	.000

In tables (16, 17, 18) it appeared that through multiple regression the hypothesis scored an R value of 0.618 which confirmed the correlation of the variables. In addition to that, a value of T appeared to be 17.908 at level 0.05 which accepted the hypothesis indicating the existence of a positive influence of smartphone applications on brand association.

❖ **H$_{1d}$**: Mobile applications have a statistically significant influence on brand loyalty from the perspective of smartphones users in Jordan

Table 19. Model Summary H$_{1d}$

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.569[a]	.324	.323	.72543

Table 20. ANOVA[a] H$_{1d}$

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	130.592	1	130.592	248.158	.000[b]
	Residual	272.596	518	.526		
	Total	403.188	519			

Table 21. Coefficients[a] H[1d]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.800	.155		5.152	.000
	smart	.648	.041	.569	15.753	.000

The last hypothesis was tested through multiple regression and scored an R value of 0.569. Also, the T value appeared to be 15.753 on level 0.05 which confirmed the correlation between the two variables and accepted the fact that smartphone applications positively influence brand loyalty.

4. Discussion

After reviewing results of study data analysis, the findings can be summed up as following:
1- Males appeared to be more into engaging in using mobile applications compared to females
2- The majority of sample was from the age range of 23-27 years old
3- The majority of the sample individuals held master degree
4- The majority of sample participants enjoyed the income of more than 1250 JOD which explains their interest in mobile applications and branding
5- The most influences variable of brand equity by mobile applications appeared to be the variable of awareness.

This explains the influence of mobile application in giving higher brand equity to the brand itself through raising the awareness of individuals towards a certain brand.

According to the results above, the researcher was able to answer the question of the study and proved that mobile applications as a marketing tool can be helpful in developing the brand equity among consumers.

Mobile applications have proven its efficiency in increasing the brand equity through the appearance of brand awareness. Results of study indicated that employing mobile applications within the marketing process can help in increasing the awareness of the brand given that the application helps in fixing the brand in the memory of the client leading to higher equity. This idea argued before by Keller (2009) who states that employing mobile marketing can help in generating sales which in its turn can work on the level of awareness. Individuals who have the application and are aware of its usability and speed can also regenerate the brand as it is more stuck to their memory.

When it comes to loyalty, marketing through mobile (mobile marketing) also proved its efficiency in increasing customers' loyalty. For example, tourism and hotel booking applications are proved to be the most efficient in that domain. Many customers are – according to Kim (2011) - present more loyalty to a certain brand when engaging in its application through the web. The use of mobile application in that sense has saved customers time and effort which managed to be welcomed by customers and users.

As for brand loyalty, Kim and Alder (2011) argued that an organization's brand is basically the core of the organization. A brand establishes a name, a logo, an image, and personality. Making the items effortlessly open, offering comfort through helpful applications, and building brand awareness ought to be fused into the advertising

methodology of each organization. Employing mobile applications can offer this and get the customers required with the brand using cell phone applications. Loyalty must begin with the collaboration of the item to the client. As the client turns out to be more aware of the item, the brand's equity develops. The positive, developing picture gives the brand a higher shot of holding the client for future item buys. Another factor for mark faithfulness is the perceptual propensity.

On the other hand, Kaplan and Haenlein (2010) insisted that picking a brand that offers items that are commonplace and agreeable to the purchaser guarantees mark steadfastness. By offering applications that permit check in/out administration, reservations, area benefit at the speed and comfort of a cell phone, permits the neighborliness benefit organizations to manufacture a solid brand association. It has been conjectured that utilizing versatile inn applications will have a constructive outcome all through the brand mindfulness, client commitment and brand responsibility, which thusly decidedly impacts the brand dependability.

5. Conclusion

Current study aimed at examining the influence of mobile application marketing on brand equity and how can an organization develop its brand equity and its variables (Brand Awareness, Perceived Quality, Brand Association and Brand Loyalty) through the employing of mobile applications as a marketing tool.

Sample of the study consisted of (520) consumers from different malls, retail stores and commercial complexes in Jordan. A self-administered questionnaire was distributed on the sample in order to gather data.

From the above mentioned results, it can be seen that there is a positive relationship between mobile application marketing and brand equity development. The use of friendly, useful and easy application can help in increasing the brand equity through focusing on the main variables including brand awareness, perceived quality, brand association and brand loyalty. The nature and characteristics of the mobile application can either attract or alienate individuals from a certain brand; this can be attributed to the technological developments which have opened the gate for brands to try their chance to be popular and widely accepted. Nowadays, customers can help in building brand equity, it not the responsibility of the organization anymore. This is read through the literature which proves that there are many practices and activities within the internet that enable the customer to build a virtual experience of the brand without even trying it; this is called the Word of Mouth – WOM – through exchanging reviews, point f vies and experiences about a certain brand; a customer may be able to form some sort of feeling towards it, those feelings might be either positive of negative.

Understanding the power of mobile application is connected to how smart the organizations are. Building an application that can match the taste of each and every individuals is not that easy. It needs a lot of analysis and understanding of customers, how they think, what motive them, and what influence their purchase decision. From that point, the role of building a strong customer relationship management CRM can't be denied, through a well-built CRM and organization may be more eligible to understanding its customers and how to build a mobile application that can math their taste and push them towards behaving in a way that is for the benefit of the brand and its equity.

Based on the reached aim and the answering of the study question, the following is recommended:
1- Carry out a research that examines the influence of mobile applications on health care performance and how can health care services be eased out for patients who do not have the ability to move from place to another like seniors and handicapped.
2- Examine the influence of mobile applications on teenagers purchase power and how can such applications increase the impulsive behavior of buying among teenage individuals in families.

References

Andrews, L., Drennan, J., and Russell-Bennett, R., (2012). Linking perceived value of mobile marketing with the experiential consumption of mobile phones. *European Journal of Marketing*, 46, 357-386. https://dx.doi.org/10.1108/03090561211202512

Awan, A.G. and Rehman, A.U., (2014). Impact of custo mer satisfaction on brand loyalty: An empirical analysis of home appliances in Pakistan. *British Journal of Marketing Studies*, 2(8), 18-32. https://pdfs.semanticscholar.org/f26f/2bd91be5431cc88829716486e10875a63f00.pdf

Becker, M., and Arnold, J., (2010). Mobile marketing for dummies. Wiley Publishing, Inc. https://scholar.google.com/scholar?q=Becker,+M.,+Arnold,+J.,+(2010).+Mobile+marketing+for+dummies.+Wiley+Publishing,+Inc.&hl=en&as_sdt=0&as_vis=1&oi=scholart

Chinomona, R., and Sandada, M., (2013). The influence of market related mobile activities on the acceptance of mobile marketing and consumer intention to purchase products promoted by SMS in South Africa. *Journal of Applied Business Research*, 29(6), 1897-1908. https://doi.org/10.19030/jabr.v29i6.8225

Djerv, S. and Malla, Z., (2012). A qualitative study of the drivers of brand preferences in the Swedish smartphone market. *Uppsala University.* http://www.diva-portal.org/smash/get/diva2:534392/fulltext02

Dushinski, K., (2009). The mobile marketing handbook. New Jersey: Information today http://books.infotoday.com/books/Mobile-Marketing-Handbook-2nd-edition.shtml

Farquhar, P. H. (1989). Managing brand equity. *Journal of Marketing Research*, 1, 24-33. https://www.coursehero.com/file/p1cg05q/Farquhar-PH-1989-Managing-brand-equity-Marketing-Research-Vol-1-No-3-pp-24-33/

Florido-Benítez, L. and Martínez, B.D.A., (2015). The effects of mobile applications as a marketing tool in airport infrastructure and airlines. *International Journal of Leisure and Tourism Marketing*, 4(3-4), 222-240. https://www.researchgate.net/profile/Lazaro_Florido-Benitez/publication/288038692_The_effects_of_mobile_applications_as_a_marketing_tool_in_airport_infrastructure_and_airlines/links/56a6a12808aeded22e354411.pdf

Forsido, M.Z., (2012). Brand loyalty in Smartphone. Master Thesis. Uppsala University https://www.semanticscholar.org/paper/Brand-loyalty-in-Smartphone-Master-Thesis-Hohenthal/35ae3791f4c516b1cb81457b1d65fd9ab8f36c6

French, A. and Smith, G., (2013). Measuring brand association strength: a consumer based brand equity approach. *European Journal of Marketing*, 47(8), 1356-1367. https://doi.org/10.1108/03090561311324363

Gordon, B.S., James, J.D. and Yoshida, M., (2016). The development of brand association measures in multiple product categories: New findings and implications for goods and service brands. *International Journal of Business Administration*, 7(3), 140. https://doi.org/10.5430/ijba.v7n3p140

Gunawardane, N., Munasinghe, A. and Dissanayake, D.M.R., (2016). Relationship between Perceived Brand Equity and Purchase Intention of Life Insurance Brands in Sri Lanka: A Concept Paper. *International Journal of Business and Management Invention*, 5(12), 106-111. https://pdfs.semanticscholar.org/11b4/20744e97b5f65561103b9eb71d4e12a0a0ce.pdf

Hashem, T. (2016). The Impact of Social Media on Customers' Image for Mobiles, *Journal of Advances in Humanities and Social Sciences*, 2(5), 269-277. https://doi.org/10.20474/jahss2.5.3

Hazlett, K., (2011). Mobile Marketing Finding Your Customers No Matter Where They Are, *Journal of Consumer Marketing*, 3, 239 -240. https://doi.org/10.1108/07363761111127662

Joshi, M., (2013). Understanding Innovation. Amity University, Lucknow Campus - Amity Business School, May 6, 2013. Joshi, Manoj, Understanding Innovation (May 6, 2013). http://dx.doi.org/10.2139/ssrn.2261050

Kaplan, A.M. and Haenlein, M., (2010). Users of the world, unite! The challenges and opportunities of Social Media. *Business Horizons*, 53(1), 59-68. http://dx.doi.org/10.1016/j.bushor.2009.09.003

Keller, K.L., (1993). Conceptualizing, measuring, and managing customer-based brand equity. *The Journal of Marketing*, 1-22. https://doi.org/10.1177/002224299305700101

Keller, K.L., (2009). Building strong brands in a modern marketing communications environment. *Journal of Marketing Communications*, 15(2-3), 139-155. https://doi.org/10.1080/13527260902757530

Kim, D. and Alder, H., (2011). Student's Use of Hotel Mobile Application: Their Effect on Brand Loyalty. *Viitattu*, 15, p. 2017.

King, N.J. and Raja, V.T., (2012). Protecting the privacy and security of sensitive customer data in the cloud. *Computer Law & Security Review*, *28*(3), 308-319. https://doi.org/10.1016/j.clsr.2012.03.003

Lee, V., Schneider, H. and Schell, R., (2004.) *Mobile applications: Architecture, design, and development*. Prentice Hall PTR. https://doi.org/10.1108/10610420010356966

Low, G.S. and Lamb Jr, C.W., (2000). The measurement and dimensionality of brand associations. *Journal of Product & Brand Management*, 9(6), 350-370. https://doi.org/10.1108/10610420010356966

Masika, C, (2013). The influence of mobile marketing on brand equity; A case study of Safaricom Limited. *Unpublished MBA Project, University of Nairobi*. https://chss.uonbi.ac.ke/sites/default/files/chss/THE%20INFLUENCE%20OF%20MOBILE%20MARKETING%20%20%20%20ON%20BRAND%20EQUITY%20AT%20SAFARICOM%20LIMITED%20Final-1-1.pdf

Pavlovaite, U., and Griesiene, I,. (2019). Development of an Art Platform in Terms of Relationship Marketing: a Biennial Case. *Transformations in Business & Economics*, 18, 2(47), 259-278.

Piaralal, S. and Mei, T.M., (2015). Determinants of Brand Equity in Private Healthcare Facilities in Klang Valley, Malaysia. *American Journal of Economics*, *5*(2), 177-182. http://article.sapub.org/10.5923.c.economics.201501.21.html

Priyantha, N.B., Miu, A.K., Balakrishnan, H. and Teller, S., (2001, July). The cricket compass for context-aware mobile applications. In *Proceedings of the 7th annual international conference on Mobile computing and networking* (pp. 1-14). ACM. http://nms.lcs.mit.edu/papers/CricketCompass.pdf

Pullig, C., (2008). What is brand equity and what does the branding concept mean to you. *Baylor University. Waco-Texas*.

Rubin, J., Gordon, M.I., Nguyen, N. and Rinard, M., (2015). November. Covert communication in mobile applications (t). In *Automated Software Engineering (ASE), 2015 30th IEEE/ACM International Conference* (pp. 647-657). IEEE. https://doi.org/10.1109/ASE.2015.66

Schierz, P.G., Schilke, O. and Wirtz, B.W., (2010). Understanding consumer acceptance of mobile payment services: An empirical analysis. *Electronic Commerce Research and Applications*, 9(3), 209-216. https://doi.org/10.1016/j.elerap.2009.07.005

Severi, E. and Ling, K.C., (2013). The mediating effects of brand association, brand loyalty, brand image and perceived quality on brand equity. *Asian Social Science*, 9(3) https://doi.org/10.5539/ass.v9n3p125

Simon, C.J. and Sullivan, M.W., (1993). The measurement and determinants of brand equity: A financial approach. *Marketing Science*, *12*(1), 28-52. https://www.jstor.org/stable/183736

Smith, K., T., (2010). Digital Marketing Strategies that Millennials Find Appealing, Motivating, or Just Annoying. *Journal of Strategic Marketing*, 1-27. https://doi.org/10.1080/0965254X.2011.581383

Sprosen, S., (2014). *The influence of branded mobile applications on consumers' perceptions of a brand: the importance of brand experience and engagement* (Doctoral dissertation, Dublin Business School).

https://esource.dbs.ie/bitstream/handle/10788/1819/ma_sprosen_s_2014.pdf?sequence=1&isAllowed=y

Tanakinjal, G., H., Deans, K., R., and Gray, B., J., (2011). Intention to Adopt Mobile Marketing: An Exploratory Study in Labuan. *Asian Journal of Business Research*, 1(1), 9-21.
https://www.academia.edu/1866689/Intention_to_Adopt_Mobile_Marketing_An_Exploratory_Study_in_Labuan_Malaysia

Tetere, M., (2011). Mobile marketing: brand performance and implications on brand identity: a case study of Adidas, Nike and Puma. *Aarhus School of Business and Social Sciences, MA in Corporate Communication*.
https://www.academia.edu/28642498/MOBILE_MARKETING_BRAND_PERFORMANCE_AND_IMPLICATIONS_ON_BRAND_IDENTITY_A_CASE_STUDY_OF_ADIDAS_NIKE_AND_PUMA_Marta_Tetere_Exam_number_402939_MA_in_Corporate_Communication

TrilloTrillo, A., (2017). Measuring Brand Equity in the Smartphone industry: An approach through Aaker's Model.
https://ruc.udc.es/dspace/bitstream/handle/2183/19763/TrilloTrillo_Adrian_TFG_2017.pdf?sequence=2

Vikström, H. and Zheng, C., (2013). Branding through mobile applications:-A case study of Swedish campaign applications.
https://pdfs.semanticscholar.org/a550/5c3f88dd964463b4b5a82ae47d80ac5d2fed.pdf

Washburn, B., (2011). Library mobile applications: What counts as success?. *Information Outlook*, 15(1), 13-15.
http://www.oclc.org/research/publications/library/2011/washburn-io.pdf

Wood, L., (2000). Brands and brand equity: definition and management. *Management Decision*, 38(9), 662-669.
https://doi.org/10.1108/00251740010379100

Mohammad Fahmi AL-ZYOUD is an Associate Professor of the Marketing Departement, Business School at Al-Ahlyyia Amman University, Amman - Jordan.
Research interests: Branding, Social Media Marketing, Advertising, CRM, Global Marketing, e Marketing, Marketing Communaction, Marketing Strategy.

ORCID ID: https://orcid.org/0000-0003-2464-8162

_____

Publisher
http://jssidoi.org/esc/home

ECO-ORIENTED CULTURE AND FINANCIAL PERFORMANCE: ROLES OF INNOVATION STRATEGY AND ECO-ORIENTED CONTINUOUS IMPROVEMENT IN MANUFACTURING STATE-OWNED ENTERPRISES, INDONESIA

Noorlailie Soewarno [1], Bambang Tjahjadi [2*]

[1,2] *Faculty of Economics and Business, Universitas Airlangga, Surabaya, Indonesia*

E-mails: [1] noorlailie-s@feb.unair.ac.id; [2]bambang.tjahjadi@feb.unair.ac.id (coressponding author)*

Abstract. This study focuses on investigating the mediating effect of innovation strategy and eco-oriented continuous improvement on the relationship between eco-oriented culture and corporate financial performance. This study provides empirical evidence to the resource-based theory stating that a corporate needs to have valuable, rare, inimmitable, and nonsubstitutable resources to remain competitive. Organization culture, innovation and continuous improvement capabilities are considered as the critical resources that must be developed by a corporate to gain competitive advantage. This study is designed as quantitative research using a variance-based or the partial least square structural equation modeling (PLS-SEM). Study on 103 managers of the manufacturing state-owned enterprises (SOEs) in Indonesia reveals that innovation strategy and eco-oriented continuous improvement partially mediate the relationship between EOC and corporate financial performance. This study contribute to provide greater understanding regarding the need to consider eco-orientation within a corporate life. It implies that for boosting the corporate financial performance, a corporate needs to adapt the eco-orientation and understand the mechanism on how eco-oriented culture affects corporate financial performance using innovation strategy and continuous improvements in eco-oriented operation management processes, customer management processes, innovation management processes, as well as regulatory and social processes. A strong eco-oriented culture will lead to beneficial innovations and eco-oriented continuous improvement; hence it has a positive association to financial performance. Many studies have been conducted on how a culture affects financial performance. However, there are still few studies describing the mechanism of how a culture can improve financial performance using innovation strategy and eco-oriented continuous improvement, especially in the context of environmental issues and in a developing country. Focusing on explaining the mediating effect, this study employs a more comprehensive structural model integrating four eco-oriented variables.

Keywords: eco-oriented culture; innovation strategy; eco-oriented continuous; improvement and corporate financial performance

1. Introduction

A growing number of governments around the world are strengthening their environmental laws and regulations because the environment affects economic development as well as the societies' quality of life. In Indonesia, for example, the Government of Indonesia (GOI) protects the environment using both national and regional level regulations to decrease the rate of emissions to 29%–41% by 2030 to meet the international agreements (Alisjahbana and Busc, 2017). Indonesia as an archipelago consisting of more than 17,000 islands and home to about 267 million people is still facing significant environmental problems. It is believed that Indonesia is the world's second-largest contributor of plastic pollutants in the oceans, after China (Indonesia Investment, 2019). In term of forest degradation, Indonesia is the third largest area of tropical forest degradation after Brazil and Congo and has contributed to environmental issues for years. Indonesia has surpassed Brazil as a tropical country with the highest levels of deforestation (Margono et al., 2014). A study by Turubanova et al. (2018) confirmed that given high rates of loss for comparatively low remaining forest area, Indonesia exhibits greater pressure on remnant primary forests than either Brazil or Congo.

Longstanding debates have also been done between protection for environmental sustainability and the production of valuable commodities (McCarthy and Kathryn, 2016). Several studies have examined the relation between economic growth and environmental degradation. A number of empirical papers find evidence of an inverted between pollution levels rise and income rising (Tamazian and Rao, 2010). Many facets of manufacturing business process have importat implications for natural environment. Design of product, selection of raw materials, operation of manufacturing process, delivary of product or service, and availability of reuse and recycle for spent products have been a big issue of environmental degradation (Ahmed et al., 1998; Klassen, 2006).

Management of firms needs to pay more attention on these rapidly growing environmental issues by building organizational culture, developing innovations in products and programs as well as improving environmentally-related business processes. Most post-modern managers are well aware that sustainability is the today's business goal (Kim and Lee, 2012; Soewarno et al., 2018). No doubt, post-modern firms are required to successfully deal with and keep innovating on the environmental issues to gain sustainable competitive advantage. Green innovation becomes strategically important from time to time.

Modern societies changed dramatically compared to the past (Chitsaz et al., 2019). In post-modernism sustainability is meant for everyone. It tries to involve all people, whether quantitative growth or qualitative development supporters, to work for those causes in which their interests overlap. The relativism of sustainability gives many opportunities for cooperation between the sustainable growth and sustainable development supporters, but because of the polarized worldviews few of them can induce real change (Ketola, 2009).

Sustainability is translated into a "triple bottom line" responsibility, with the implication that the assessment of business results should be based not only on economic performance but also on the environmental and social impact as well (Sheth et al., 2011). Sustainable development and sustainability assessment are two issues that have been addressed by academe and practinioners including local government agencies, community members, as well as commercial and industrial planners (Sacirovic et al., 2018; Zhou, et al., 2018). Industrial symbiosis is defined as a collective approach to competitive advantage in which separate industries exchange materials, energy, water and/or by-products, plays an important role in the transition towards sustainable development (Chertow, 2000, Chertow, 2007). Industrial symbiosis resolves resource depletion problems, waste management

and pollution using waste streams to generate more value across industrial actors (Baldassarre et al., 2019; Chertow, 2007).

The research community has also paid increasing attention to the environment as compared to other aspects of sustainability (Ferreira et al., 2016). Until recently, sustainable development was perceived as an essentially environmental issue, concerning the integration of environmental concerns into economic decision-making (Lehtonen, 2004). Wernerfelt (1984) in the Resource-Based View (RBV) stated that a firm is a bundle of resources, and the way that they are combined enables firms to have a competitive advantage among others. Resource-based view (RBV) is a managerial framework used to determine the strategic resources a firm can exploit to achieve sustainable competitive advantage. Business process, strategy and organization culture are also part of resources that firms owned and used for achieving competitive advantage. The RBV concerns that those resources owned by firms must meet valuable, rare, inimitable and nonsubstitutable (VRIN) criteria (Nason and Wiklund, 2018).

The RBV as a theory is inpired by the work of Penrose (1959) arguing that resources are a source of competitive advantage. Hoopes et al. (2003) stated that the resources account for inter-firm performance differences. The RBV argues that the firm should be considered as a bundle of resources which is defined by Wernerfelt (1984) as anything which can provide the firm with a strength or weakness. These resources are also defined by Barney and Arikan (2001) as tangible and intangible assets which are used by the firm to formulate and implement strategies. In order to be a source of competitive advantage the resource should be valuable, rare, difficult to imitate it and no other resource which can substitute it (Nason and Wiklund, 2018).

Many studies have been conducted on the role of culture in relation to financial performance (Ogbonna and Harris, 2000; Melo, 2012; Nazarian et al. 2017; Rottig and Reus, 2018; Zhou et al., 2018). However, there are still few studies that explain the mechanism of how a culture can improve financial performance, especially in the context of environmental issues. Culture is also important in sustainability involvement among firms around the world as found in the study of Coulmont et al. (2018) which stated that firms in countries with high individualism or high masculinity rankings are more likely to affiliate with the UNGC (United Nations Global Compact). UNGC is an organization that align strategies and operations with universal principles on human rights, labour, environment and anti-corrupetion, and take actions that advance societal goals. Study results show that highly individualist societies (IDV) and high masculinity levels countries appear to be more affiliate with the UNGC. Individuals are less preoccupied and with social and environmental issues and have a boarder viewpoint (Cox et al., 2011; Husted, 2005). And masculinity levels have a positive impact on the UNGC affiliation to enhance their corporate image. These motivations are consistent with the values promoted by masculine society, which include competition, power acquisition, and especially recognition (Cetindamar and Husoy, 2007).

In the era of environmental awareness, eco-oriented culture must be the main habit of management and the focus of every strategy. A growing number of business leaders commits to create a better environment of the world by integrating eco-orientation to their corporate culture. Referring to the philosophy of strategy maps by Kaplan and Norton (2004), one of organizational capital owned by a company is its culture. Organizational culture that includes consideration of the environmental impacts in it is called eco-oriented culture (Kim and Lee, 2012). This culture will lead management of the company to formulate and execute their strategies, including innovation strategy.

In the most basic sense, strategy is the primary means for achieving competitive advantage and subsequent superior performance outcomes (Hansen et al., 2006; Olson et al., 2018). Innovation is a main strategic tool in

order to gain a competitive advantage in such complex environments (Akman and Yilmaz, 2008; Kwak et al., 2018). Also, innovation is a basic precondition for long-term success, growth, performance continuance and firms' survival (Akhlagh et al., 2013). Firms should be dedicated to investing in research and development, manufacturing innovative products and achieving substantial performance to be competitive (Karabulut, 2015). As an alternative to the role of innovation in competitive strategy, the value innovation methodology on strategy has been proposed by Kim and Mauborgne (2005, 2017) regarding how to create uncontested market space and making the competition irrelevant. Leavy (2017) explores how the value innovation strategy works in practice and how it has evolved since its introduction.

Innovation strategy that a firm uses to operate its business must be executed in excellent business processes that lead to customer satisfaction and improved financial performance. Mattera and Baena (2015) used the innovation theory in conjunction with the stakeholder theory to analyze a firm's intangible assets enhancement and found that corporate social responsibility (CSR) affects a firm's value-added in Spanish firms. A study by Chuan and Lin (2017) of 115 financial service firms in Taiwan revealed that technology, human and business resources are crucial in developing an e-service capability, and an innovation strategy positively influences organizational performance. Nowadays, as a global society evolves, innovation strategy appears to be an evolutionary process at work, resulting in the progression of organizational philosophies from the industrial-focused production orientation to the human-focused eco-orientation (Miles and Munilla, 1993). Production activity that has an impact on ecological sustainability had been monitored and controled by government to minimize environmental damage. Environmental concerns have thus impacted manufacturing firms' innovation (Wang & Wang, 2019). Hence firms may adopt an eco-orientation as a strategic competitive advantage, for instance eco-oriented corporate culture and eco-oriented continuous improvement which will be investigated in this study.

Each company has differences in integrating environmental aspects into its daily operations, including building an eco-oriented culture, innovating on eco-oriented products for business processes to achieve better financial performance. Porter, Sheehan and Foss (2009) stated that the activity is the smallest unit of a strategy. The integration of the activity-based and resource-based views provides a comprehensive explanation of how a firm creates value. Therefore, innovation strategy must be reflected in the daily activities of the company's internal business processes including eco-oriented continuous improvements in operations management processes, customer management processes and innovation management processes as well as regulatory and social processes.

The objective of this study is to analyze and empirically test the mechanism of how an eco-oriented culture affects financial performance using innovation strategy and eco-oriented continuous improvement. This study uses a more comprehensive model to examine the mediating effects instead of the direct effects among variables and it investigates the issue of eco-orientation which becomes a trend in the world.

The main contribution of this study is to provide empirical evidence and a more comprehensive understanding of activity-based and resource-based views, especially the mechanism of how a culture affects financial performance in the era of environmental awareness. This study also provides evidence on how managers in a developing country perceive the importance of managing environmental issue in their companies. The study also addresses practical implications and suggestions for policy-making either in a company or a government institution.

Based on the previous discussions, this study has three research questions as follows:
RQ1. Does eco-oriented continuous improvement mediate the relationship between innovation strategy and corporate financial performance?

RQ2. Does eco-oriented continuous improvement mediate the relationship between eco-oriented culture and corporate financial performance?

RQ3. Do eco-oriented continuous improvement and innovation strategy mediate the relationship between eco-oriented culture and corporate financial performance?

2. Literature Review and Hypotheses Development

2.1. Eco-oriented Culture, Eco-oriented Continuous Improvement and Corporate Financial Performance
Jabnoun (2001) stated that the success of continuous improvement initiatives is dependent on many factors that include leadership, structure and shared organizational values. Continous improvement not only refers on changes in managerial activities but it also must be followed by improvements in term of knowledge transfer from owner to employee and senior workers (Herlina et al., 2019). It means that corporate culture can be one of the antecedents of continuous improvement. Culture plays a strategic role in business process improvements. Zehir et al. (2011) found that leadership and organizational culture affect business performance outcomes of firms in Istanbul, Turkey. An empirical study on the role of culture by Chatterjee et al. (2018) also confirmed that flexible organizations (predominantly clan and/or adhocracy cultures) have a more supportive learning transfer environment than stable organizations (predominantly market and/or hierarchy cultures). Stone, Joseph, & Blodgett, (2004) indicating that an organization's ability to develop an eco-oriented corporate culture is related to several factors, which are top management emphasis, management risk aversion, rewards and incentives, local community concerns, organizational connectedness, and industry regulatory climate. Meanwhile Kim and Lee, (2012) find that Stakeholder Pressure can influence the adoption of environmental logistics practices (ELP) to build a unique Eco-Oriented Culture. Continuous improvements will have a good impact on financial performance. This is supported by Chen (2018) stating that a better management of supply chain risks has affected corporate financial performance. Eco-oriented continuous improvement in development, sourcing, manufacturing and transportation activities needs one policies to find solutions for company's environmental issues. Furthermore, this improvement will increase company's efficiency and enhance their revenue opportunity (Orsato, 2009). The first hypothesis is based on logically thinking that the organizational culture focusing on eco-orientation will positively drive eco-oriented continuous improvement which will then enhance corporate financial performance. Therefore, the following first hypothesis is proposed:

H_1: Eco-oriented continuous improvement mediates the relationship between eco-oriented culture and corporate financial performance

2.2. Innovation Strategy, Eco-oriented Continuous Improvement, and Corporate Financial Performance
Scholars have provided empirical evidence that innovation strategy determines the success in innovations and continuous performance improvements, and that it will also have a positive impact on financial performance. A study by Yasar et al. (2017) showed a mediating effect of continuous improvement on innovation-financial performance relationship in 384 companies of Turkish manufacturing companies. Karabulut (2015) demonstrated that the innovation strategy of Turkish manufacturing firms leads them to improve their financial performance. Nybakk and Jenssen (2012) also found that innovation strategy enhances financial performance. Chuan and Lin (2017) proved that an innovation strategy positively influences organizational performance of 115 financial service firms in Taiwan. Pogodina et al. (2019) explained that innovation activity increases efficiency in industrial companies which are largely determined by the level of their innovation and marketing potential. However, Nybakk et al. (2011) stated that the model of innovation strategy and climate for innovation accounts for only 16% of the variation in firm performance. It means that innovation strategy becomes an antecedent only if it is moderated or mediated by other factors. Thus, when a company adopts the innovation strategy with the focus of

the environmental aspect, it is proposed that this strategy must be expressed in the daily operations or business processes which must be also continuously improved in order to meet the requirements of changing market. A better adaptation to an eco-oriented market will certainly lead to a better financial performance (Kwon & Lee, 2019). For this reasoning, the following second hypothesis is:

H2: Eco-oriented continuous improvement mediates the relationship between innovation strategy and corporate financial performance.

2.3. Eco-oriented Culture, Innovation Strategy, Eco-oriented Continuous Improvement and Corporate Financial Performance

As previously stated, culture affects innovation. An exploratory study by Kaasa (2017) revealed the effects of different cultural dimensions on different innovation indicators covering many EU countries and neighbouring countries and confirmed that innovation processes are strongly reliant on culture. A study by Rafailidis et al. (2017) on 480 Greek mid-to-high technology and Small and Medium Enterprises confirmed that quality mediates the relationship between cultural ambidexterity and innovation performance. Prim et al. (2017) also proved that cultural dimensions associate with the degree of innovation at the national level.

The linkage between innovation strategy and continuous improvement is reflected in the interview report conducted by Bapst (1994) which stated that the process of innovation development, especially the early part of the development process, must be systematically analyzed and continuously improved to reduce the repeated same mistakes. Moreover, Calantone, et al. (2002) stated that a positive learning climate is beneficial for firms that aspire to stand out through product development, and new product development requires continuous organizational renewal. It can be concluded that to achieve a better firm's performance, managers who adopt innovation strategy need to implement learning activities which reflect the continuous improvements in their organization. Hence, the third hypothesis is formulated based on the following logical thinking. If a company has adopted a strong eco-oriented culture and wants to improve their financial performance, then the company must execute it in their daily operations by implementing innovation strategy and eco-oriented continuous improvement. To test the logical linkage among eco-oriented culture, innovation strategy, eco-oriented continuous improvement and corporate financial performance, the following third hypothesis is proposed:

H3: Eco-oriented continuous improvement and innovation strategy mediate the relationship between eco-oriented culture and corporate financial performance.

3. Research Model

This study has four variables, namely Corporate Financial Performance (CFP) as a dependent variable, Innovation Strategy (IST) and Eco-oriented Continuous Improvement (ECI) as mediating variables, and Eco-oriented Culture (EOC) as an independent variable. The relationship among those variables is presented in a research model in Figure 1.
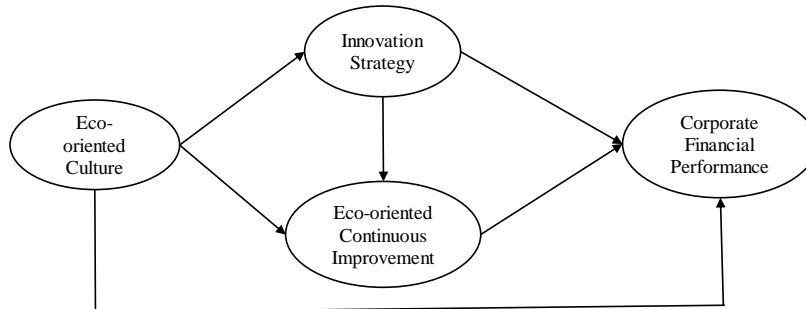
Fig.1. Research model

3.1. Research setting and sample

This study derived a sample from 200 managers of the SOEs in Indonesia with the status of "perseroan terbatas" or a limited liability company. There are 101 SOEs and the number of the manufacturing subsidiaries is unknown due to limited access. Indonesia was chosen in this study because environmental issues are still a major problem, such as plastic waste, forest fire haze, factory pollution and other issues that require a change in culture and management mindset. The state-owned enterprises (SOEs) were chosen because they play a significant role along with large private conglomerates in the Indonesian economy (see Appendix). However, the study focuses only on the SOEs. Questionnaires with a covering letter describing the objective of the study and confidentiality assurance were distributed to every corporate secretary of the SOEs, with a request to distribute to the managers in the company and the manufacturing subsidiaries. As many as 104 managers participated and returned the questionnaires. Only 1 questionnaire was not properly completed, yielding a total of 103 usable responses. Therefore the effective response rate was 51.5%. Table 1 shows the types of industry and the number of participated managers.

Table 1. Type of Industry and Participated Managers

	Industry	Participated Managers
1.	Heavy equipment	8
2.	Nuclear power	3
3.	Industrial machinery	9
4.	Pharmaceutical	10
5.	Explosives	2
6.	Ship	7
7.	Salt producer	12
8.	Glass producer	13
9.	Fertilizer	11
10.	Fabric manufacturer	13
11.	Steel	12
12.	Cement	3
	TOTAL	**103**

3.2 Analytical Technique

This study employed a variance-based or partial least square (PLS) stuctural equation modeling to test the hypotheses, The PLS was considered suitable for this study for the following reasons. Firstly, it can handle multiple dependent and independent variables simultaneously (Chin, 1998a, 1998b). Secondly, it can deal with small sample sizes and multicollinearity among independent variables (Nitzl, 2016). Thirdly, it does not require a normal distributional assumption (Chin, 1998; Chin and Newsted, 1999).

3.3 Instruments

3.3.1 Corporate Financial Performance

Corporate financial performance is operationally defined as the perception of a manager regarding the four financial perspectives as in the strategy maps created by Kaplan & Norton (2004), namely improve cost structure, increase asset utilization, expand revenue opportunities and enhance customer value. Among those four perspectives, only two perspectives were used to provide the measurements for this indicator, namely increase asset utilization and expanding revenue opportunities for the following reasons. Firstly, Increasing asset utilization closely relates to improving cost structure. This means that when asset utilization increases, then costs will be reduced. Secondly, expanding revenue opportunities also closely relates to enhancing costumer value. This means that customer value will be increased when a company creates more opportunities to sell products to customers. It was measured by using a questionnaire with a 6-point Likert scale which is used to avoid central tendency bias. This concept is regarded as the model which is appropriate for measurement (Chang, 1993). With use of this scale, the respondents cannot choose the moderate value, middle point in this kind of rating scale, the respondents have to consider the answer for a while. Chen, Lee, & Stevenson (1995) found that Japanese and Chinese were more likely to choose the midpoint of a Likert scale item than Americans, but we found this effect only for items involving expression of positive feelings. We made a conclusion that Asians with likely the same cultural collectivism groups as Japan and Chinese, has the same way to respond Likert Scale using mid-point. That is the reason why this research used 6-Point Likert Scale.

3.3.2   Eco-oriented Continuous Improvement

Eco-oriented continuous improvement is operationally defined as the perception of a manager regarding continuous improvement considering eco-orientation during 2015 to 2017. It was measured with a four-item-questionnaire adapted from Lee (2004) using a 6-point Likert scale, but with some modifications to measure the eco-orientation.

3.3.2.1 Innovation Strategy

Innovation strategy is operationally defined as the perception of a manager regarding innovation strategy she/he has formulated during 2015 to 2017. It was measured using a questionnaire adapted from Akman and Yilmaz (2008) with a 6-point Likert scale. This instruments used Venkatraman's typology (1989) which defined innovation strategy as composed of six dimensions, namely aggressiveness, analysis, defensiveness, futurity, proactiveness and riskiness. For this study, only four dimensions were used, excluding aggressiveness and analysis due to practicality reasons. Both aggressiveness and analysis are not used in this study because they do not fit the character of SOEs management which should not act aggressively and tend to be excessively bureaucratic.

3.3.3   Eco-oriented Culture

Eco-oriented culture is operationally defined as the perception of a manager regarding her/his firm's culture which focuses on eco-orientation during the last three years. It was measured with the eco-orientation questionnaire adapted from Stone et al. (2004) using a 6-point Likert scale.

4. Analysis and Results

4.1 Descriptive Statistics

Table 2 presents the results of the descriptive statistics of variables. It shows both theoretical and actual as well as minimum and maximum scores of responses, mean and the standard deviation. Although there is a wide range of responses, the mean values show that the managers tended to have a strong commitment to their corporate financial performance (5.06). They believed that their company implements eco-oriented continuous improvement (5.04) in their daily operations. The less highly rated eco-oriented culture (4.69) and innovation strategy (4.77) reflect that the state-owned enterprises in Indonesia have not yet become concerned with eco-oriented culture and innovation strategy.

Table 2. Results of descriptive statistics

Variable	Theoretical Score		Actual Score		Mean	SD
	Min	Max	Min	Max		
Eco-oriented Culture (EOC)	1	6	3	6	4.69	0.58
Innovation Strategy (IST)	1	6	2	6	4.77	0.95
Eco-oriented Continuous Improvement (ECI)	1	6	3.25	6	5.04	0.66
Corporate Financial Performance (CFP)	1	6	3	6	5.06	0.75

The focus of this study is to empirically prove the relationships among variables studied using a more comprehensive model. Therefore, this study employed a structural equation modeling for analytical method. The research hypotheses were tested using a variance-based application package which is commonly used and is suitable for social research (Hair, Risher, Sarstedt, & Ringle, 2018). The PLS structural equation modeling is a technique which simultaneously examines both measurement and structural models. The measurement model specifies the relationship between the measures and the latent variables or constructs. It also assesses the reliability and validity of measures relating to specific constructs. The structural model identifies the relationships among constructs (Chin, 1998b).

4.2 Measurement model analysis

The objective of the measurement model analysis is to evaluate the relationship between measures and constructs so that the reliability and validity of measures relating to specific constructs can be assessed. Table 2 shows that all measures are significant and above the 0.60 loading level. Chin (1998a, 1998b) stated that loading factors should be at least 0.60 meaning that the measure is accounting for at least 60 percent of the variance of the underlying latent variable. The cut-off point of 0.60 shows that the measures share more variance with their respective constructs than with the error variance. Furthermore, Table 3 shows the composite reliability coefficients for the constructs are all above the accepted level of 0.70 as stated by Nunnaly (1967).

The construct validity consists of convergent validity and discriminant validity. The average variance extracted (AVE) was employed to assess convergent validity in this study. According to Hulland (1999), a construct should have an AVE measure of 0.50 or more to be considered as having adequate convergent validity. Table 3 reveals that the AVEs for all the constructs are above 0.50, and this provides evidence of convergent validity.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Table 3. Results of reliability and convergent validity

Latent Variable	Loading	P Value
Eco-oriented Culture (Composite Reliability = 0.815; AVE = 0.594)		
EOC 1	0.765	<0.001
EOC 2	0.779	<0.001
EOC 3	0.769	<0.001
Innovation Strategy (Composite Reliability = 0.953; AVE = 0.834)		
IST 1	0.906	<0.001
IST 2	0.906	<0.001
IST 3	0.913	<0.001
IST 4	0.929	<0.001
Eco-oriented Continuous Improvement (Composite Reliability = 0.915; AVE = 0.730)		
ECI 1	0.873	<0.001
ECI 2	0.86	<0.001
ECI 3	0.807	<0.001
ECI 4	0.877	<0.001
Corporate Financial Performance (Composite Reliability = 0.913; AVE = 0.840)		
CFP 1	0.917	<0.001
CFP 2	0.917	<0.001

Table 4. Discriminant validity.

	EOC	IST	ECI	CFP
EOC	**0.771**			
IST	0.396***	**0.913**		
ECI	0.365*	0.659***	**0.855**	
CFP	0.365*	0.647***	0.65***	**0.917**

***Significant at $p < 0.01$
*Significant at $p < 0.1$

Discriminant validity in this study is evaluated by comparing the square roots of AVEs with the correlation between constructs to describe whether a construct shares more variance with its measures than with other constructs (Fornell & Larcker, 1981). It is valid when the square root of AVE of a construct is greater than the correlation between the construct with another construct. Table 4 shows correlation among constructs in the off-diagonal and the square root of AVE in the diagonal. Table 4 indicates adequate discriminant validity because the diagonal elements are all greater than their respective off-diagonal elements. In conclusion, it is demonstrated that the measurement model is reliable and valid.

Table 4 also shows positive significant correlations between eco-oriented culture and corporate financial performance (r = 0.365; p<0.1), innovation strategy (r = 0.396; p<0.01); eco-oriented continuous improvement (r = 0.365; p<0.1). These results suggest that eco-oriented culture is an important variable in improving innovation strategy, eco-oriented continuous improvement and corporate financial performance. In addition, there is a positive and significant relationship between innovation strategy and eco-oriented continuous improvement (r = 0.659; p<0.01) indicating that innovation strategy may improve eco-oriented continuous improvement.

4.3 Structural model analysis
The structural model is employed to test the hypotheses of this study. This model test is used to examine if the effect of eco-oriented culture on corporate financial performance is mediated by innovation strategy and eco-oriented continuous improvement. In performing the structural model analysis the following two-step procedures (Baron and Kenny, 1986) were used. Firstly, a test for knowing if the eco-oriented culture affects corporate financial performance was conducted. Secondly, PLS was run for the full model by including innovation strategy and eco-oriented continuous improvement. Table 5 (Panel A) shows that before including mediating variables, eco-oriented culture is positively associated with corporate financial performance (path coefficient = 0.39; p<0.01). This result leads to further analysis by introducing the mediating variables of innovation strategy and eco-oriented continuous improvement.

Table 5 (Panel B and Panel C) shows the following results. First, the relationship between eco-oriented culture and eco-oriented continuous improvement is positive and significant (path coefficient = 0.125; p=0.096<0.1), and the relationship between eco-oriented continuous improvement and corporate financial performance is also positive and significant (path coefficient = 0.406; p<0.001). Therefore, hypothesis 1 stating that eco-oriented continuous improvement mediates the relationship between eco-oriented culture and corporate financial performance is supported (path of indirect effect=0.051; p-value = 0.025<0.05). Secondly, the relationship between innovation strategy and eco-oriented continuous improvement is positive and significant (path coefficient=0.611; p<0.001), and the relationship between eco-oriented continuous improvement and corporate financial performance is also positive and significant (path coefficient =0.406; p<0.001). Therefore, the second hypothesis stating that eco-oriented continuous improvement mediates the relationship between innovation strategy and corporate financial performance is supported. Thirdly, the relationship between eco-oriented culture and innovation strategy is positive and significant (path coefficient=0.412; p<0.001), innovation strategy and eco-oriented continuous improvement is positive and significant (path coefficient=0.125; p=0.096), and the relationship between eco-oriented continuous improvement and corporate financial performance is also significant (path coefficient =0.406; p<0.001). Thus, the third hypothesis stating that eco-oriented continuous improvement and innovation strategy mediate the relationship between eco-oriented culture and corporate financial performance is also supported.

The direct effect of the relationship between eco-oriented culture and corporate performance before including mediating variables shows that the value of β coefficient to be 0.39 with p<0.01. The direct effect of the relationship between eco-oriented culture and corporate performance after including mediating variables shows the smaller value of β coefficient as 0.125 with still significant p=0.097 <0.1. As argued by Baron and Kenny (1986), a full mediation exists if a significant direct effect of the independent variable and dependent variable becomes insignificant after controlling for the effects of the mediating variable. Also, Baron and Kenny (1986) claim that a partial mediation exists if the relationship between the independent variable and dependent variable remains significant after controlling for the effects of the mediating variable. This means that in this study, innovation strategy and eco-oriented continuous improvement partially mediate the relationship between eco-oriented culture and corporate financial performance.

Table 5. PLS results of path coefficients

PANEL A:	β Coefficient	Probability	R² Coefficient of Determination
Before including mediating variables			
Direct Effect			
EOC > CFP	0.39	p<0.01	0.15
PANEL B:	**β Coefficient**	**Probability**	**R² Coefficient of Determination**
After including mediating variables			
Direct Effect			
EOC > CFP	0.125	p<0.1	0.53
EOC > IST	0.412	p<0.001	0.17
EOC > ECI	0.125	p<0.1	0.45
IST > CFP	0.329	p<0.001	0.53
IST > ECI	0.611	p<0.001	0.45
ECI >CFP	0.406	p<0.001	0.53
PANEL C:	**Indirect Effect**	**Probability**	**Decision**
Panel B: Indirect Effects			
EOC > ECI > CFP	0.051	p<0.05**	H_1 is supported
EOC > IST > CFP	0.136	p<0.001***	H_2 is supported
EOC > IST > ECI > CFP	0.102	P<0.05**	H_3 is supported

5. Discussion

When the first hypothesis is supported, it means that this study has provided empirical evidence of the mechanism on how eco-oriented culture affects corporate performance through eco-oriented continuous improvement. The finding of descriptive statistics suggests that managers have a high commitment in achieving a good financial performance. This issue is understood because the company's financial performance greatly affects their financial condition as employees. Furthermore, managers feel the need to make continuous improvements in their business processes, especially in producing environmentally friendly products and Green products which are needed to meet the expectations of consumers who are increasingly concerned about the environmental issues. The low highly rating of eco-oriented culture by managers suggests that the implementation of organizational culture which includes the environmental issues is not strong enough at the SOEs and its subsidiaries in Indonesia. This explains why Indonesia still faces vast environmental problems. It is suggested that the management of the SOEs and its subsidiaries build a strong eco-oriented culture in order to take advantage of the coming of the green consumers era and the threat of eco-oriented competitors. Eco-oriented culture and eco-oriented continuous improvement can be used as the source of competitive advantage to face the global competitors starting to flood the Indonesian market.

The low highly ratings of eco-oriented culture also suggests that managers of the SOEs and subsidiaries in Indonesia have a relatively above-average concern on the importance of eco-oriented culture in relation to eco-oriented continuous improvement and financial performance. They view that culture is important for improving the business processes and the financial success of their company. They realize that having an organizational culture which includes environmental concerns is crucial to building habits in the daily management activities. Although now they don't have a strong eco-oriented culture, managers tend to perceive that culture will drive their company to continuously make improvements in environmentally friendly products and programs in order to achieve financial success. This result concludes the path that the stronger the eco-oriented culture, the better is the eco-oriented continuous improvement, and then the better is the corporate financial performance. This finding supports and extends the results of the previous studies by Jabnoun (2001), Zehir et al. (2011), Chatterjee et al. (2018), and Chen (2018).

The second path to excellent corporate financial performance is to have a good understanding of the mechanism on how innovation strategy affects corporate financial performance through eco-oriented continuous improvement. The moderate rating of innovation strategy reflects that the managers of the SOEs and their subsidiaries in Indonesia have above-average concerns on the importance of innovation as strategy. This finding suggests that managers feel the need for their company to have an innovation strategy as a means to deal with the dynamics of a rapidly changing business environment. Good innovations in environmentally friendly products and programs will guarantee the continuity of the company. The company may become the first mover as the green innovator and enjoy its competitive advantage position. The innovation capability must be continuously executed in the daily business processes, and then it will lead to customer satisfaction and financial success. This finding is in line with the results of the previous studies by Nybakk and Jenssen (2012), Karabulut (2015), and Chuan and Lin (2017).

Finally, the third path to excellent corporate financial performance can be achieved by understanding the mechanism of how to use both innovation strategy and eco-oriented continuous improvement in the relationship between eco-oriented culture and financial performance. As stated by Kaplan and Norton (2004), excellent financial performance needs revenue strategy and cost strategy. Every manager understands that revenue improvements can be achieved through delivering the right value proposition to customers, including eco-awareness or green customers. Then, the managers will align their business processes, especially customer management processes and operation management processes to meet the eco-oriented customers and always continuously make improvements. To generate a good internal business process, the managers need the readiness of human capital, information capital and organization capital (M. Chen, 2005; Kaplan & Norton, 2005). Culture is one strategic element in organization capital that provides a foundation for members of the organization to work with a trusted management philosophy (Posner, Kouzes, & Schmidt, 1985). Without the presence of a strong organizational culture, the company does not have a solid foundation in developing and executing innovation strategies as well as making continuous improvements so that it will be difficult to achieve a good financial performance. The understanding of the third path to excellent corporate financial performance in the era of green stakeholders, including customers and green competitors is crucial for managers, including the managers of the SOEs and their subsidiaries in Indonesia. This result supports and expands the results of previous studies by Bapst (1994); Calantone et al. (2002); Kaasa (2017); Rafailidis et al. (2017); and Prim et al. (2017).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Conclusions

Many previous studies have been conducted to find evidence of the direct impact of organizational culture or strategies or continuous improvement on financial performance (Cox, Friedman, & Tribunella, 2011; Hillestad, Xie, Haugland, & Hillestad, 2010; Posner, Kouzes, & Schmidt, 1985). However, very rarely are studies conducted to seek the mediating effect of innovation strategy and continuous improvement on the culture-financial performance relationship, especially in the context of environmental awareness (eco-orientation) and in a developing country (Soewarno, Tjahjadi, & Fithrianti, 2019).

Using a sample of 103 SOEs managers, this study has provided empirical evidence of the resource-based view (RBV). This study employs a variance-based or partial least squares structural equation modeling to test the hypotheses. The results show the following. Firstly, this study proves that eco-oriented continuous improvement partially mediates the relationship between eco-oriented culture and corporate financial performance. Secondly, this study confirms that eco-oriented continuous improvement partially mediates the relationship between innovation strategy and corporate financial performance. Thirdly, this study also proves that eco-oriented continuous improvement and innovation strategy partially mediate the relationship between eco-oriented culture and corporate financial performance.

This study makes an original contribution in terms of seeking the mediating effects, building a more comprehensive model, focusing on eco-orientation and setting research in a developing country. The results help managers to understand the importance of eco-orientation and awareness in their company and how to use it in achieving a better performance. This implies that managers of the SOEs need to build a strong eco-oriented culture, to develop and execute innovation strategy, to implement that culture and innovation in continuous process improvements, so that it will drive financial performance. This encourages managers to have a more comprehensive and holistic understanding of a value creation process.

This study has the following limitations: Firstly, this research is conducted in Indonesia and uses managers of the SOEs and their subsidiaries as sample, therefore it limits the generalization. To improve the generalization, future research must be conducted in other countries with different cultures and regulations as well as managers in publicly listed companies. Secondly, using questionnaires to obtain data from the managers' perception may raise the issue of cognitive bias. In the future, researchers can use secondary data even though this is also difficult due to the issue of proxies and measurements as well as confidential data gathering. Thirdly, in terms of the analysis method, this study employs a partial least squares (PLS) structural equation modeling. It raises the issue of causality, and therefore a future study could employ other approaches such as experimentation. The model and hypotheses of this study can still be used by future researchers with the addition of other variables such as eco-oriented creativity and legitimacy.

References

Ahmed, N.U., Montagno, R.V, & Firenze, R.J. 1998. Organizational performance and environmental consciousness : an empirical study. *Management Decision* 36(2): 57–62. https://doi.org/10.1108/00251749810204124

Akhlagh, E. M., Moradi, M., Mehdizade, M., & Ahmadi N. D. 2013. Innovation strategies, performance diversity and development: An empirical analysis in Iran construction and housing industry. *Iranian Journal of Management Studies* 6(2): 31-60. https://doi.org/10.22059/IJMS.2013.32063

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Akman, G. & Yilmaz, C. 2008. Innovative capability, innovation strategy and market orientation: An empirical analysis in Turkish software industry. *International Journal of Innovation Management* 12 (1): 69-111. https://doi.org/10.1142/S1363919608001923

Alisjahbana. A.S & Busc, J.M. 2017. Forestry, Forest Fires, and Climate Change in Indonesia. *Bulletin of Indonesian Economic Studies* 53(2): 111-136. https://doi.org/10.1080/00074918.2017.1365404

Baldassarre, B., Schepers, M., Bocken, N., Cuppen, E., & Calabretta, G. (2019). Industrial Symbiosis : towards a design process for eco-industrial clusters by integrating Circular Economy and Industrial Industrial Ecology perspectives. *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2019.01.091

Bapst, G. 1994. Lightning Strategies for Innovation, *Update on Excellence*, March/April 1994. Retrieved from http://www.ame.org/sites/default/files/target_articles/94q2u4.pdf

Baron, R.M. & Kenny, D.A. 1986. The moderator-mediatorvariable distinction in social psychological research: conceptual, strategic and statistical considerations. *Journal of Personality and Psychology* 51: 1173-1182. https://doi.org/10.1037//0022-3514.51.6.1173

Calantone, R. J., Cavusgil, S. T., & Zhao, Y. 2002. Learning orientation, firm innovation capability, and firm performance. *Industrial Marketing Management*, 31: 515-524. https://doi.org/10.1016/S0019-8501(01)00203-6

Cetindamar, D. & Husoy, K. 2007. Corporate social responsibility practices and environmentally responsible behavior: The case of the United Nations global compact. *Journal of Business Ethics* 76(2): 163–176. https://doi.org/10.1007/s10551-006-9265-4

Chatterjee, A., Pereira, A. & Bates, R. 2018. Impact of individual perception of organizational culture on the learning transfer environment. *International Journal of Training and Development,* 22(1): 15-33. https://doi.org/10.1111/ijtd.12116

Chen, C., Lee, S., & Stevenson, H.W. 1995. Response Style and Cross-Curtural Comparisons of Rating Scales among East Asians and North American Students. *Psychological Science* 6(3). https://doi.org/10.1111/j.1467-9280.1995.tb00327.x

Chen, H.L. 2018. Supply chain risk's impact on corporate financial performance. *International Journal of Operations & Production Management* 38(3):713-731. https://doi.org/10.1108/IJOPM-02-2016-0060

Chen, M. 2005. An empirical investigation of the relationship between intellectual capital and firms' market value and financial performance. 6(2): 159–176. https://doi.org/10.1108/14691930510592771

Chertow, M. R. (2000). Industrial Symbiosis: Literature and Taxonomy. *Annual Review of Energy and the Environment*, 25, 313–337.

Chertow, M. R. (2007). "Uncovering" Industrial Symbiosis. *Journal of Industrial Ecology*, 11(1).

Chin, W.W. 1998. *The partial least squares approach to structural equation modeling*. In G. A. Marcoulides (Ed.), *Modern methods for business research,* London: Lawrence Erlbaum Associates.

Chin, W.W. 1998. Issues and opinion on structural equation modeling. *MIS Quarterly: Management Information Systems* 22(1). Retrieved from https://www.researchgate.net/publication/220260360_Issues_and_Opinion_on_Structural_Equation_Modeling/references

Chin, W.W. & Newsted, P.R. 1999. Structural modelling analysis with small samples using partial least squares In R.H. Hoyle (Ed.) *Statistical strategies for small sample research.* Thosand Oaks: Sage Publications.

Chitsaz, E., Tajpour, M., Hosseini, E., Khorram, H., & Zorrieh, S. (2019). The effect of human and social capital on entrepreneurial activities: a case study of Irand and implications. *Entrepreneurship and Sustainability Issues*, 6(3), 1393–1403.

Coulmont, M., Lambert, K., & Berthelot, S. 2018. National culture and UN global compact affiliation. *Social Responsibility Journal* 14(3): 584-600. https://doi.org/10.1108/SRJ-09-2016-0155

Cox, P. L., Friedman, B.A., & Tribunella, T. 2011. Relationships among Cultural Dimensions, National Gross Domestic Product, and Environmental Sustainability. *Journal of Applied Business and Economics* 12(6): 46–56. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.1031.7959&rep=rep1&type=pdf

Ferreira, L.M., Silva, C., & Azevedo, S.G. 2016. An environmental balanced scorecard for supply chain performance measurement. *Benchmarking: An International Journal* 23(6): 1398-1422. https://doi.org/10.1108/BIJ-08-2013-0087

Fornell, C. & Larcker, D.F. 1981. Structural Equation Models with Unobservable Variables and Measurement Error: Algebra and Statistics. *Journal of Marketing Research* 18(3): 382. https://doi.org/10.2307/3150980

Hair, J. F., Risher, J. J., Sarstedt, M. & Ringle, C. M. 2018. When to use and how to report the results of PLS-SEM. *European Business* 31(1). https://doi.org/10.1108/EBR-11-2018-0203

Hansen, E., Dibrell, C., & Down, J. 2006. Market Orientation, Strategy, and Performance in the Primary Forest Industry. *Forest Science*, 52(3): 209. Retrieved from https://www.researchgate.net/publication/233585754_Market_Orientation_Strategy_and_Performance_in_the_Primary_Forest_Industry

Herlina, E., Syarifudin, D., & Kartika, R. 2019. The Local Knowledge Transfer Based on Continuous. *Journal of Management Review*, 3(1), 277–284.

Hillestad, T., Xie, C., Haugland, S. A., & Hillestad, T. 2010. Innovative corporate social responsibility : the founder ' s role in creating a trustworthy corporate brand through "green innovation". *Journal of Product & Brand Management* 19(6): 440–451. https://doi.org/10.1108/10610421011085758

Hulland, J. 1999. Use of Partial Least Squares (PLS) in strategic management research: a review of four recent studies. *Strategic Management Journal* 20(2): 195–204. Retrieved from https://www.jstor.org/stable/3094025?seq=1#metadata_info_tab_contents

Husted, B. W. 2005. A Cross-National Study of the Determinants of Environmental Sustainability. Journal of Chemical Information and Modeling, 45(3): 349–371. https://doi.org/10.1017/CBO9781107415324.004

Indonesia Investment. 2019, April 09. Environmental Pollution: Indonesia's Battle against Plastic Waste: March 2019 Edition. *Indonesia Investment.* Retrieved from https://www.indonesia-investments.com/id/news/todays-headlines/environmental-pollution-indonesia-s-battle-against-plastic-waste/item9110?

Jabnoun, N. 2001. Values underlying continuous improvement, *The TQM Magazine* 13(6): 381. https://doi.org/10.1108/09544780110406137

Kaasa, A. 2017. Culture and Innovation: Evidence from the European Union and Neighbouring Countries. *Journal of Economic and Social Geography*, 108(1): 109-128. https://doi.org/10.1111/tesg.12194

Kaplan, R. S. & Norton, D.P. 2005. The strategy map : guide to aligning intangible assets. Strategy & Leadership, 32(2004): 10–17. https://doi.org/10.1108/10878570410699825

Kaplan, R.S. & Norton, D. P. 2004. *Strategy Maps: Converting Intangible Assets into Tangible Outcomes.* Harvard Business School Press: Boston, MA.

Karabulut, A.T. (2015). Effects of Innovation Strategy on Firm Performance: A Study Conducted on Manufacturing Firms in Turkey. *Procedia - Social and Behavioral Sciences*, 195: 1338 – 1347. https://doi.org/10.1016/j.sbspro.2015.06.314

Ketola, T. (2009). Pre-Morphean Paradigm – An Alternative to Modern and Post-Modern Paradigms of Corporate Sustainability. *Sustainable Development* 17: 114–126. https://doi.org/10.1002/sd.406

Kim, S. T., & Lee, S. Y. (2012). Stakeholder pressure and the adoption of environmental logistics practices: Is eco-oriented culture a missing link?. *The International Journal of Logistics Management*, 23(2): 238–258. https://doi.org/10.1108/09574091211265378

Kim, W.C. & Mauborgne, R. 2005. *Blue Ocean Strategy: How to Create Uncontested Market Space and Make Competition Irrelevant*. HBS Press.

Kim, W.C. & Mauborgne, R. 2017. *Blue Ocean Shift: Beyond Competing - Proven Steps to Inspire Confidence and Seize New Growth*. Hachette Book: New York

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Klassen, R.D. 2006. Exploring the linkage between investment in manufacturing and environmental. *International Journal of Operations & Production Management* 20(2): 127–147. https://doi.org/10.1108/01443570010304224

Kwak, D.W., Seo, Y.J. & Mason, R. 2018. Investigating the relationship between supply chain innovation, risk management capabilities and competitive advantage in global supply chains. *International Journal of Operations & Production Management,* 38(1): 2-21. https://doi.org/10.1108/IJOPM-06-2015-0390

Kwon, H. & Lee, J. 2019. Exploring the differential impact of environmental sustainability , operational efficiency, and corporate reputation on market valuation in high-tech-oriented firms. *International Journal of Production Economics* 211(January): 1–14. https://doi.org/10.1016/j.ijpe.2019.01.034

Leavy, B. 2018.Value innovation and how to successfully incubate "blue ocean" initiatives. *Strategy & Leadership* 46(3):10-20. https://doi.org/10.1108/SL-02-2018-0020

Lee, H. 2004. The role of competence-based trust and organizational identification in continuous improvement. *Journal of Managerial Psychology*, 19(6): 623. https://doi.org/10.1108/02683940410551525

Lehtonen, M. 2004. The environmental – social interface of sustainable development: capabilities, social capital , institutions. *Ecological Economics*, 49: 199–214. https://doi.org/10.1016/j.ecolecon.2004.03.019

Margono, B.A., Potapov, P.V., Turubanova, S., Stolle, F. and Hansen, M.C. 2014. Primary Forest Cover Loss in Indonesia 2000–2012. *Nature Climate Change*, 4: 730–735. Retrieved from https://www.nature.com/articles/nclimate2277

Mattera, M. & Baena, V. 2015. The key to carving out a high corporate reputation based on innovation: corporate social responsibility. *Social Responsibility Journal* 11(2); 221-241. https://doi.org/10.1108/SRJ-03-2013-0035

Melo, T. 2012. Determinants of corporate social performance: the influence of organizational culture, management tenure and financial performance. *Social Responsibility Journal*, 8(1): 33-47. https://doi.org/10.1108/17471111211196557

Miles, M.P. & Munilla, L.S. 1993. The Eco-orientation: An Emerging Business Philosophy?. *Journal of Marketing Theory and Practice*, 1(2): 43-51. Retrieved from https://www.researchgate.net/publication/285013439_Eco-orientation_An_emerging_business_philosophy

Nason, R.S. & Wiklund, J. 2018. An Assessment of Resource-Based Theorizing on Firm Growth and Suggestions for the Future. *Journal of Management* 44(1); 32-60. https://doi.org/10.1177/0149206315610635

Nazarian, A. Atkinson, P. & Foroudi, P. 2017. Influence of national culture and balanced organizational culture on the hotel industry's performance. *International Journal of Hospitality Management,* 63: 22-32. https://doi.org/10.1016/j.ijhm.2017.01.003

Nitzl, C. 2016. The use of partial least squares structural equation modelling (PLS-SEM) in management accounting research: Directions for future theory development. *Journal of Accounting Literature*, 37: 19–35. https://doi.org/10.1016/j.acclit.2016.09.003

Nunnaly, J.C. 1967. *Psychometric theory*. New York: McGraw-Hill.

Nybakk, E. & Jenssen, J.I. 2012. Innovation Strategy, Working Climate, and Financial Performance in Traditional Manufacturing Firms: An Empirical Analysis. *International Journal of Innovation Management*, 16(2). https://doi.org/10.1142/S1363919611003374

Nybakk, E., Crespell, P., & Hansen, E. 2011. Climate for Innovation and Innovation Strategy as Drivers for Success in the Wood Industry: Moderation Effects of Firm Size, Industry Sector, and Country of Operation. *Silva Fennica*, 45(3): 415-430. https://doi.org/10.14214/sf.110

Ogbonna, E. & Harris, L.C. 2000. Leadership style, organizational culture and performance: empirical evidence from UK companies. *The International Journal of Human Resource Management*, 11(4): 766-88. https://doi.org/10.1080/09585190050075114

Olson, E.M., Slater, S.F., G. Tomas M.Hult. G.T.M. & Olson, K.M. 2018. The application of human resource management policies within the marketing organization: The impact on business and marketing strategy implementation, *Industrial Marketing Management,* 69: 62-73. https://doi.org/10.1016/j.indmarman.2018.01.029

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Orsato, R. J. 2009. When does it pay to be green? In Orsato, R.J. *Sustainability Strategies*, London: Palgrave Macmillan, 3–22. https://doi.org/10.1057/9780230236851

Pogodina, T. V., Aleksakhina, V. G., Burenin, V. A., Polianova, N., & Yunusov, L. A. (2019). Towards the innovation-focused industry development in a climate of digitalization: the case of Russia. *Entrepreneurship and Sustainability Issues* 6(4): 1897–1906.

Posner, B. Z., Kouzes, J. M. & Schmidt, W. H. 1985. Shared Values Make a Difference: An Empirical Test of Corporate Culture. *Human Resource Management*, 24(3): 293–309. https://doi.org/10.1002/hrm.3930240305

Prim, A.L., Filho, L.S., Zamur, L.S.F & Di Serio, L.Z. 2017. The relationship between national culture dimensions and degree of innovation. *International Journal of Innovation Management* 21(01): 1730001-1700022. https://doi.org/10.1142/S136391961730001X

Rafailidis, A., Trivellas, P. & Polychroniou, P. 2017. The mediating role of quality on the relationship between cultural ambidexterity and innovation performance. *Total Quality Management & Business Excellence*, 28 (9-10): 1134-1148. https://doi.org/10.1080/14783363.2017.1309122

Rottig, D. & Reus, T.H. 2018. Research on Culture and International Acquisition Performance: A Critical Evaluation and New Directions. *International Studies of Management & Organization*, 48(1): 3-42. https://doi.org/10.1080/00208825.2018.1407082

Sacirovic, S., Ketin, S. & Vignjevic, N. 2018. Eco-industrial zones in the context of sustainability development of urban areas. *Environmental Science and Pollution Research*, 26(24): 24346-24356. https://doi.org/10.1007/s11356-018-1390-y

Sheehan, N.T. & Foss, N.J. 2009. Exploring the roots of Porter's activity-based view. *Journal of Strategy and Management*, 2(3): 240-260. https://doi.org/10.1108/17554250910982480

Sheth, J.N., Sethia, N.K., and Srinivas, S. 2011. Mindful consumption: a curtomer-centric approach to sustainability. *Journal of the Academy Marketing Science*, 39: 21-39. https://doi.org/10.1007/s11747-010-0216-3

Soewarno, N., Tjahjadi, B., & Fithrianti, F. 2019. Green innovation strategy and green innovation The roles of green organizational identity and. *Management Decision*. https://doi.org/10.1108/MD-05-2018-0563

Stone, G. & Wakefield, K.L. 2000. Eco-orientation: an extension of market orientation in an environmental context. *Journal of Marketing Theory and Practice* 8(3): 21-31. https://doi.org/10.1080/10696679.2000.11501872

Stone, G., Joseph, M., & Blodgett, J. 2004. Toward the creation of an eco-oriented corporate culture : a proposed model of internal and external antecedents leading to industrial firm. *Journal of Business & Industrial Marketing*, 19(1): 68–84. https://doi.org/10.1108/08858620410516754

Stone, G., Mathew, J., & Blodgett, J. 2004. Toward the creation of an eco-oriented corporate culture: a proposed model of internal and external antecedents leading to industrial firm eco-orientation. *The Journal of Business & Industrial Marketing*, 19 (1): 68. https://doi.org/10.1108/08858620410516754

Tamazian, A., & Rao, B.B. 2010. Do economic financial and institutional developments matter for environmental degradation ? Evidence from transitional economies. *Energy Economics*, 32(1): 137–145. https://doi.org/10.1016/j.eneco.2009.04.004

Turubanova, S., Potapov, P.V., Tyukavina, A. & Hansen, M.C. 2018. Ongoing primary forest loss in Brazil, Democratic Republic of the Congo, and Indonesia, *Environment Research Letter*, 13(7). https://doi.org/10.1088/1748-9326/aacd1c

Venkatraman, N. 1989. Strategic orientation of business enterprises: The construct, dimensionality, and measurement. *Management Science*, 35(8): 942-962. Retrieved from https://www.jstor.org/stable/2632149

Wang, C., & Wang, C. (2019). How organizational green culture influences green performance and competitive advantage The mediating role of green innovation. *Journal of Manufacturing Technology*. https://doi.org/10.1108/JMTM-09-2018-0314

Wernerfelt, B. 1984. A Resource-Based View of the Firm. *Strategic Management Journal* 5(2): 171-180. Retrieved from http://links.jstor.org/sici?sici=0143-2095%28198404%2F06%295%3A2%3C171%3AARVOTF%3E2.0.CO%3B2-L

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Yasar, N. B., Sezen, B., & Karakadilar, I. S. (2017). Mediating effect of continuous improvement on the relationship between innovation and financial performance. *Total Quality Management & Business Excellence*, 1–15. https://doi.org/10.1080/14783363.2017.1353415

Zehir, C., Ertosun. O.G., Zehir, S., & Muceldili, B. 2011. The Effects of Leadership Styles and Organizational Culture over Firm Performance: Multi-National Companies in Istambul. *Procedia – Social and Behavioral Sciences*, 24: 1460-1474. https://doi.org/10.1016/j.sbspro.2011.09.032

Zhao, H., Teng, H., & Wu, Q. 2018. The effect of corporate culture on firm performance: Evidence from China. *China Journal of Accounting Research* 11(1): 1-19. https://doi.org/10.1016/j.cjar.2018.01.003

Zhou, H., Yang, Y., Chen, Y., & Zhu, J. 2018. Data envelopment analysis application in sustainability: The origins, development and future directions. *European Journal of Operational Research* 264(1): 1-16. https://doi.org/10.1016/j.ejor.2017.06.023

Appendix

List of Manufacturing State-owned Enterprises (SOEs):

1. Heavy equipment: PT Boma Bisma Indra
2. Nuclear power: PT Batan Teknologi
3. Industrial machinery: PT Barata Indonesia
4. Pharmaceutical : PT Kimia Farma; PT Bio Farma; PT Indo Farma
5. Explosives: PT Dahana
6. Ship: PT PAL Indonesia; PT Dok dan Perkapalan Surabaya
7. Salt producer: PT Garam
8. Glass producer: PT Industri Gelas
9. Fertilizer: PT Pupuk Indonesia Holding
10. Fabric manufacturer: PT Cambrics Premissima
11. Steel: PT Krakatau Steel
12. Cement: PT Semen Indonesia; PT Semen Baturaja

Noorlailie SOEWARNO is the Doctor of Accounting at Faculty of Economics and Business Universitas Airlangga, Surabaya, Indonesia. She has been teaching accounting for more than 20 years. Her research interest including management accounting, strategic management, and performance management.
ORCID ID: https://orcid.org/0000-0003-2134-2125

Bambang TJAHJADI is the Professor of Accounting at Faculty of Economics and Business Universitas Airlangga, Surabaya, Indonesia. He has been teaching accounting for more than 30 years. His research interest including management accounting, strategic management, and performance management. Bambang is a member of professional organization such as Certified Professional Marketers and Certified Management Accountant.
ORCID ID: https://orcid.org/0000-0002-9781-729X https://orcid.org/0000-0003-2134-2125

Publisher
http://jssidoi.org/esc/home

GREEN GROWTH ASSESSMENT DISCOURSE ON EVALUATION INDICES IN THE EUROPEAN UNION

Agnė Šneiderienė [1], Rasa Viederytė [2], Lilita Abele [3]

[1,2] *Department of Economics, Faculty of Social Sciences and Humanities, Klaipėda University, S. Nėries str. 5, 92227, Klaipėda, Lithuania*
[3] *Environmental Research Center, Liepaja University, Liela iela 14, 3401, Liepaja, Latvia*

E-mails: [1]agne.sneideriene@ku.lt ; [2]rasa.viederyte@ku.lt ; [3]lilita.abele@liepu.lv

Abstract. Investigating green growth is a continuing scientific concern within academia, governments, and international organizations in recent years. This paper analyzes the discourse on green growth assessment methods. There are three primary aims of this study: 1. To identify factors influencing or stimulating green growth. 2. To analyze sets, frameworks, and indices of green growth indicators designed by international organizations and scientists. 3. To develop the Green Growth evaluation Index and to validate it on the assessment of green growth status of the European Union countries. The methodological approach taken in this study is a mixed methodology based on data analysis, generalization, and index assessment. The study offers important insights into the discourse on green growth evaluation, analyzes green growth measurement tools, and provides the Green Growth Index which can be applied to evaluate green growth in developing and developed countries. Secondary data have been collected from Eurostat, the World Bank databases, and UNDP Human Development Reports for the year 2018. The results show that green growth is uneven in the European countries; the Green Growth Index and all three pillars vary between countries due to the fact that several countries lag behind all the indicators included in the Green Growth Index.

Keywords: green economy; green growth; assessment methods; economic evaluation; green growth index; European Union

1. Introduction

With an emphasis on climate change, interest in green economy and green growth is increasing. It is agreed on the need to replace traditional economic models in a more environmentally friendly manner. Green growth is indicated as one of the ways to replace the existing models. It should be noted that there is used a variety of terms related to green economy (smart economy, sustainable economy, circular economy, low-carbon economy, blue economy, etc.). Besides, the boundaries of each term are not clearly explored (Pieroni et al., 2019). UNEP (2011), Popa et al. (2011), Pahle et al. (2016), He et al. (2019), Lin and Zhu (2019) propose their own concepts for understanding the concept of green economy. Green growth can be seen as a new source of capital accumulation and job creation (Gibbs, O'Neill, 2017). Factors influencing green growth are analyzed in the works of Guo et al. (2020), Capasso et al. (2019), Du et al. (2019), Adeel-Farooq et al. (2018) and others. Capasso et al. (2019) indicate economic and social barriers to green growth. Song et al. (2019) emphasize that green economic growth is the direction of future economic growth in the world. Kasztelan (2017) states that the concepts of green growth and green economy are linked and that differences between them have become unclear; moreover, they are used almost interchangeably. The aim of green economy and green growth is almost the same, i.e. to identify the ways of improving the results of economic activity taking into account the existing climate problems and increasing deficiency in natural resources (Kasztelan, 2017). However, the concept of green economy is more related to economic transformation in order to improve social welfare and justice and to reduce environmental threats and ecological deficiencies. Meanwhile, green growth is strictly connected with the idea of green economy (UNEP, 2011)

in order to achieve continuing economic growth, at the same time recognizing the role of natural capital and ensuring climatic and environmental sustainability.

Literature search has helped to reveal a few studies which attempt to evaluate green growth (Pan et al., 2019; Kararach et al. 2016). It is agreed that GDP or GDP per capita are not appropriate indicators to analyze green growth of a country. First attempts to propose sets or frameworks of green growth indicators have been made by OECD (2011), UNEP (2012), and other international institutions. Although some research (Pan et al., 2019; Kararach et al. 2018) has been carried out on the evaluation of the green growth index, there is still very little scientific understanding of the possibilities of green growth evaluation. Quantitative analyses of green growth have been conducted by Lyytimäki et al. (2018), Kararach et al. (2018), Yang et al. (2019), but it should be noted that these studies are based on the investigation of various indicators. Furthermore, the application of scientists' designed green growth indices differs. Therefore, the *scientific problem* can be formulated as follows: what methodologies can be used to evaluate the green growth parameters and results of a country.

The *purpose of this article* is to evaluate the European Union countries according to the developed Green Growth Index.

The *object* of the paper is the evaluation of green growth.

Three primary aims of this study are determined as follows:
1. To identify factors influencing or stimulating green growth.
2. To analyze sets, frameworks, and indices of green growth indicators designed by international organizations and scientists.
3. To develop an index and to evaluate green growth in the European Union countries.

Research methods: scientific analysis, systemizing and generalization, analysis of green growth measurement possibilities proposed by international organizations and scientists during the period of 2012-2019, secondary data analysis, estimation of green growth in the European Union countries in 2018 on the basis of the designed index.

This scientific theoretic paper provides with an overview of the discourse on green growth assessment methods, the existing green growth measurement tools, the design of the Green Growth Index and its application for the European Union countries.

2. Discourse of Green Economy and Green Growth

In recent years, interest in green economy and green growth has been growing. There is a need to replace the traditional economic models in order to address various environmental issues and key economic challenges. Moreover, several policy initiatives have been suggested and implemented for transitioning to a green economy (Lindman, Söderholm, 2016). A concept of green economy has been introduced by Pearce et al. (1989) in response to the undervaluation of environmental and social costs in the current price system. Since then, it has been expanded (see Table 1).

Table 1. Alteration of the definition of Green Economy

Variations of the definition of Green Economy	Author(s)	Year
A way to substitute renewable energy and low-carbon technologies for fossil fuels, and to improve resource and energy efficiency.	UNEP	2011
An economic development based on the sustainable development model and knowledge of ecological economics.	Popa et al.	2011
A term for the growth of the entire economy.	Jänicke	2012
A concept is that low-carbon energy technologies have considerable potential to achieve socio-economic objectives alongside environmental ones.	Pahle et al.	2016
An "umbrella" concept that encompasses different implications with regard to growth and well-being, or efficiency and risk reduction in the use of natural resources.	Loiseau et al.	2016
An integrated, economy-wide framework contrasts with many previous sustainable development initiatives that have been more sector or site focused.	Swainson, Mahanty	2018
A broad concept that includes different interpretations, definitions and practices ranging from the greening of current neoliberal economies to radical transformations of these economies.	Bergius et al.	2018
A way for solving environmental problems that shows confidence in human ingenuity and technological advancements.	Gazzola et al.	2019
A resource-saving and environment-friendly economy.	He et al.	2019
A socially inclusive and economically beneficial yet environmentally sustainable alternative.	Laibach et al.	2019
An efficient way for sustainability, which focuses on economic growth, resource conservation, and environmental friendliness.	Lin, Zhu	2019

Source: developed by the authors according to the mentioned scientists

As it can be seen in Table 1, almost all definitions of green economy include economic growth. In order to meet climate and energy targets, participation of disparate agents should be involved (Paroussos, Fragkiadakis, Fragkos, 2019). Green economy is seen as a new source of capital accumulation and job creation (Gibbs, O'Neill, 2017), a way to achieve sustainable development (Lin, Zhu, 2019), direct valuation of natural capital and nature's services (Popa et al., 2011). Moreover, the expansion of green economy is related to energy generation, resource use and environmental management (Popa et al., 2011). Li et al. (2015) indicate a need to encapsulate three sectors (industry, people, and government) in order to create green economy. Meanwhile, Gibbs, O'Neill (2017) indicate that there is a spectrum of interpretations of the green economy, from

market-led, business-as-usual to proposals for more radical changes such as a steady-state economy and degrowth. Governments in countries across the world increasingly adopt the green growth discourse to underline their ambition for the greening of their economies (Capasso et al., 2019). Notwithstanding, Wanner (2015) emphasizes that in the green growth discourse there is no 'one-size-fits-all' prescription for green growth strategies. This can be explained by differences in contexts of policy and institutional frameworks, economic and political circumstances, levels of development, and economic and environmental interdependencies. Furthermore, advanced, emerging, and developing countries face different challenges and opportunities (OECD, 2011). According to Hickel and Kallis (2020), the notion of green growth emerged as a central theme at the Rio+20 Conference on Sustainable Development in 2012. Since then, green growth is seen as a response to climate change and ecological breakdown and one of key elements in achieving sustainable development (Capsasso et al., 2019; Hichel, Kallis, 2020). "Green growth is about fostering growth and development while ensuring that the natural assets continue to provide resources and environmental services on which our well-being relies" (OECD, 2011, p. 18). The World Bank (2012) relates green growth with an efficiency in using natural resources, minimization of pollution and environmental impact, and resilience of natural capital. Meanwhile, UNEP (2011) emphasizes its role in income growth and improvement of human well-being at the same time reducing environmental risks and ecological scarcities. It should be noted that, according to Hickel and Kallis (2020), the concept of green growth is still new and infinite. According to Song et al. (2019), green economic growth must achieve the following goals: economic growth, job creation, and environmental impact reduction. Paroussos et al. (2019) emphasize that green growth requires that GHG emission reduction takes place at such rate that allows clean energy technologies to become market competitive.

Green growth can be stimulated by increased fiscal spending on public goods, government expenditures on education, increased spending on R&D and innovation process (Lin, Zhu, 2019), substantial financial resources (Mohamed et al., 2014), environmental regulations, support for technology policies and consumer-awareness programs (Holroyd, 2014), market building and the effective workings of the market system (Wanner, 2015), development of infrastructure (Li et al., 2015), fossil fuel scarcity (De Cian et al., 2016), increased technological innovation and efficiency accompanied by foreign direct investments (Nasir et al., 2019), adoption of environmentally friendly technologies (Hille et al., 2019), creation of new, environmentally friendly industries (Dornan et al. 2018), local capabilities (including technologies, institutions, skills) or single sector (Capasso et al., 2019), subsidies and tax incentive policies (Chang et al., 2020), creation of a favourable environment for long-term green investment (Guo et al., 2018; Adeel-Farooq et al., 2018; Geisendorf, Klippert, 2017), building a green finance system (Zhang, Wang, 2019), economic openness and R&D scale (Song et al., 2019), growth of a green bond market (Elliott, Zhang, 2019; Ngwenya, Simatele, 2020).

It should be noted that in this context, economic efficiency and environmental benefits are opposite to each other. But they are related when green growth is analyzed. Pan et al. (2019) raise two questions: what influence has green economic system of a country and how to identify the factors influencing green economy? Different regions vary in their level of socio-economic development and environmental challenges (Guo et al., 2020), thus, countries with the same level of green economy can make different policy choice (Pan et al., 2019) in order to ensure green economic growth. Moreover, there is no obvious evidence about the interactions and dynamics relationships among those factors (Pan et al., 2019). Factors influencing green economy are analyzed in the works of Guo et al. (2020), Capasso et al. (2019), Du et al. (2019). Guo et al. (2020) indicate that green investment banks can leverage the power of private investment to support green infrastructure and technological innovation. Furthermore, Du et al. (2019) emphasize that political factors have high relationship with green investment and these investments reflect the government's emphasis on environmental improvement. GDP, GDP per capita, and fixed assets of investments play important roles in the development of green investments (Du et al., 2019). Adeel-Farooq et al. (2018) find out that economic growth has positive impact on the environmental performance. On the other hand, green growth can also encounter barriers. Capasso et al. (2019) indicate the following barriers to green growth: negative externalities associated with investments in a public good like knowledge; uncertainty of investments; market failure. All these obstacles can slow down growth in developing or economically well-developed countries. Özbuğday et al. (2020) highlight an impact of increased resource efficiency of small and medium-sized enterprises for boosting their productivity, competitiveness and growth generation. Song et al. (2019) emphasize that green economic growth is the direction of future economic growth in the world.

3. Analysis of Green Growth measurement tools

Attempts to evaluate green growth can be found in the scientific literature (Pan et al., 2019; Kararach et al. 2016). According to Pan et al. (2019), green growth asserts that continued economic expansion – measured by GDP – is or can be made to be compatible with planet's ecology. Yaduma (2018) criticizes the use of GDP measures in resource investigations because of the two main reasons. Firstly, it treats the depreciation of physical capital as a positive contribution to national income. Secondly, GDP measures of output do not reflect real incomes of resource-intensive economies as green accounting procedures are not

incorporated. Song et al. (2019) emphasize that in order to calculate green GDP, net natural capital consumption is required (including resource consumptions, environmental damage, and environmental protection and restoration initiatives). Therefore, some attempts have been made to adjust GDP. For example, GDP adjusted for social and environmental costs is in the Index of Sustainable and Economic Welfare, the Measure of Economic Welfare, and the Genuine Progress Indicator. Nahman et al. (2016) indicate other indices: the Human Development Index, the Ecological Footprint and the Environmental Performance Index, Ecological Footprint and the System of Environmental–Economic Accounting. But it should be noted, that in all those indices only a few indicators (2-4 units) are evaluated. Hickel and Kallis (2020) note that many governments have adopted the practice of dividing GDP by domestic material consumption, which measures the efficiency of resource use by an economy. It should be noted that DMC is a problematic indicator because it does not include the material impact involved in the production and transport of imported goods, outsourced production has been shifted off balance sheet (Hickel, Kallis, 2020). Meanwhile, Zhu et al. (2020) indicate that energy consumption is one of the basic indicators to measure the level of economic development of a country. First attempt to propose sets or a framework of green economy/growth indicator has been made by OECD (2011) – this institution proposed green growth measurement framework. Other attempts by international institutions to set up sets or frameworks of green growth indicator are shown in Figure 1.

Figure 1. Green growth measurement frameworks or sets proposed by international organizations
Source: developed by the authors

As it can be seen in Figure 1, OECD, UNEP, Global Green Growth Institute, and the Asian Development Bank have proposed a few sets or frameworks of green economy indicator. In these frameworks and sets, different amounts of indicators are included. For example, GGGI (2019) Green Growth Index analyzes 36 indicators of 115 countries in four dimensions: efficient and sustainable resource use, natural capital protection, green economic opportunities, and social inclusion. Meanwhile, the Asian Development Bank (2018) proposes a set of 28 indicators that cover economic growth, social equity, and environmental sustainability. It must be emphasized that the index proposed by the Asian Development Bank (2018) has been applied only for calculation of the integrated green growth index in Asian countries.

In practice, some examples of green growth and/or green economy measurement indicators can be also found: the Global Green Economy Index (GGEI), the Green Economy Benchmark Index (QGREEN), the Low Carbon Competitiveness Index (LCCI), the Climate Change Performance Index (CCPI), the Green Economy Index (GEI). It should be noted that all these indicators are more suitable to evaluate companies or cities according to the issues of green growth. Moreover, their application is based only on one dimension or on a few sectors. Thus, Nahman et al. (2016), Kararach et al. (2018), Pan et al. (2019) and others have conducted models for green growth evaluation.

Lyytimäki et al. (2018) emphasize that the indicators of green growth have high expectations to live up to. There is a need for giving of a comprehensive and reliable view of the key socio-economic trends and serving for easy-to-understand and effective tools. Indicators should be: acceptable, comparable, measurable, relevant, and internationally used (Lyytimäki et al., 2018). In Table 2, scientists' attempts to analyze green growth are proposed.

Table 2. Attempts to analyze green growth

Model name	Methodology	Dimensions	Nb. of key indicators	Application	Authors
Green economy index	Index assessment	Economic Social Environmental	26 indicators	193 countries	Nahman et al. (2016)
Key indicators for green growth	Index assessment	Human well-being Ecosystems Economy	19 indicators	Finland	Lyytimäki et al. (2018)
Environmental Performance Index	Econometric model	Green field investment Energy consumption	4 indicators	9 Asian developing countries	Adeel-Farooq et al. (2018)

		Economic growth Urbanization			
Green growth index (GGI)	Index assessment	The socioeconomic context and characteristics of growth Environmental and resource productivity Monitoring the natural asset base Gender Governance	48 indicators	22 African countries	Kararach et al. (2018)
Global productivity index (GPI)	Econometric model	Global Malmquist-Luenberger productivity index	5 indicators	30 provinces in China	Pan et al. (2019)
Green development level	Index assessment	Environment Economy Society	19 indicators	109 cities in China	Yang et al. (2019)

Source: developed by the authors

As it can be seen in Table 2, there are differences in dimensions covered by green growth indices. The majority of indices related to green growth are based on index assessment and include more indicators (from 19 to 48) than the ones that are based on econometric analysis. Moreover, some indices (for example, Lyytimäki et al., 2018) are designed to evaluate only environmental impact on country's economy. Nahman's et al. (2016) proposed Green Economy Index is based not only on statistical data or indices such as Human Development Index, but also on survey on self-reported overall life satisfaction.

Comparing green growth indices proposed by international organizations with those composed by scientists, it should be noted that indices proposed by organizations are applied more widely than the ones proposed by the scientists. Furthermore, some scientists' proposed indices can be applicable only to developing countries, for example, Kararach et al. (2018). In the index designed by these authors, some specific indicators are integrated, for example, HIV/AIDS prevalence (age 15-49). Yang's et al. (2019) proposed Green development level model is suitable for index assessment in cities, because some indicators are relevant only to cities, for example: green area per capita or percentage of green coverage in built-up areas.

In order to give comprehensive and reliable insights, indices should be composed in an easy-to-understand and effective way; indicators included in index calculation should be widely used, measurable, comparable, and relevant. Only then it would be possible to measure green growth of different countries (developed and developing) all around the world. As all indices, proposed by international institutions and scientists, differ, there new has been developed a new index – Green Growth Index.

4. Green Growth Index in the European Union

This study seeks to obtain data which will help to address the gaps of green growth evaluation. For this purpose, an integrative index to evaluate green growth patterns has been developed. This index is based on the Inclusive Green Growth Index (IGGI) proposed by the Asian Development Bank (2018) and is supplemented with some economic indicators included in indices proposed by Nahman et al. (2016), Kararach et al. (2018), and Yang et al. (2019). The design of the Green Growth Index combines the strengths of the existing indices and frameworks into one composite index with a wider coverage of indicators. Besides, these indicators are related to economic, environmental and social dimensions of growth. This index can be applicable for developed and developing countries throughout the world. The proposed index and its pillars are shown in Figure 2.

The following steps have been taken in designing the Green Growth Index:

- Three pillars of the Green Growth Index (Economy, Society and Environment) and 32 indicators are expressed in different units (per cent, euro, number), thus the indicators have been given to scores ranking from 0 to 1, by using the min-max approach. This method assigns the indicators by dividing the difference between a country's indicator performance and the sample minimum value by the difference between the sample minimum and the sample maximum values of indicators of 27 countries (see Equation 1).

$$New\ variable = \frac{variable - min_x}{max_x - min_x} \qquad (1)$$

- Indicators where a higher value implies a worse outcome or where the impact direction is negative (for example, gross general government debt or air pollution) are expressed by using Equation 2.

$$New\ variable = \frac{max_x - variable}{max_x - min_x} \qquad (2)$$

- The indicators for each pillar are assigned by equal weights, because, in our opinion, all three pillars are equally important. Therefore, the average of the normalized scores is calculated. As indicators vary widely between the European Union countries, values of each pillar are also in wide range.
- Countries are ranked according to each pillar group.
- The scores of each of the three pillars are further assigned equal weights and aggregated to compute the score for the Green Growth Index (see Equation 3).

$$GGI = \frac{1}{3}*(\text{average economy}) + \frac{1}{3}*(\text{average society}) + \frac{1}{3}*(\text{average environment}) \qquad (3)$$

Economy	Society	Environment
• Real GDP per capita • GDP per capita growth rate • Trade openness • Age dependency rate • Gross general government debt • R&D expenditures • Adjusted net savings	• Unemployment rate • Employment rate • Life expectancy gender gap • Pupils enrolled in primary education • Labor force participation gender gap • Life expectancy at birth • Infant mortality rate • Access to improved sanitation • Access to improved water • Gini coefficient on inequality • Poverty gap • Mean years of schooling • Population with secondary education • Students in tertiary education • Number of beds in hospitals and health centers	• Natural resource rent • Renewable freshwater resources • Water productivity • Air pollution • Greenhouse gas emmision • Primary energy consumption • Use of renewable energy • Share of environmental taxes in total tax revenues • Resource productivity and domestic material consumption • Recycling rate of municipal waste

Figure 2. Pillars and Indicators of the designed Green Growth Index
Source: Adopted from the Asian Development Bank (2018), Nahman et al. (2016), Kararach et al. (2018), Yang et al. (2019).

Sample countries and data collection. Secondary data on the thematic area of Green Growth have been collected for all 27 European Union countries. Data have been collected from Eurostat, the World Bank databases and UNDP Human Development Reports for the year 2018. The European Union countries have been selected for the evaluation of the Green Growth Index due to uniform regulation of goals set for the implementation and achievement of green growth, as well as data availability for all the selected countries.

Results. According to the designed Green Growth Index (GGI), all three pillars have been evaluated for the European Union countries in 2018. In Figure 3, the average each country's economy pillar and the average of the EU-27 countries are shown. Luxembourg's indicators included in the economic pillar calculations have been above average or the highest ones. After the calculation of all indicators and estimation of average of country's economic pillar according to included rates, Luxembourg's economic pillar has exceeded 1, i.e. it was 1.41.
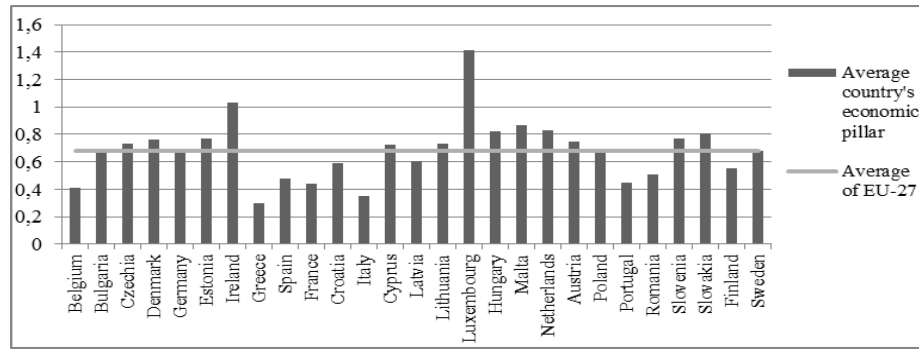
Figure 3. Economy pillar of the Green Growth Index, 2018
Source: developed by the authors

As it can be seen in Figure 3, according to data of 2018, 13 countries of the European Union have exceeded the average of the Economy pillar. The European Union countries according to the Economy pillar of the Green Growth Index are distributed between 0.3 and 1.41. The highest score (1.41) is for Luxembourg. This result has been achieved due to high level of GDP per capita and trade openness indicators and low rates of age dependency and governmental debt. Meanwhile, the lowest score (0.3) is in Greece. Government debt rate is the highest and adjusted net savings are the lowest ones in Greece.

The average each country's Society pillar and the average of the EU-27 countries are represented in Figure 4. The indicators included in the calculation of the Society pillar vary widely between the European Union countries and, therefore, average country's Society pillar has not reached 1.
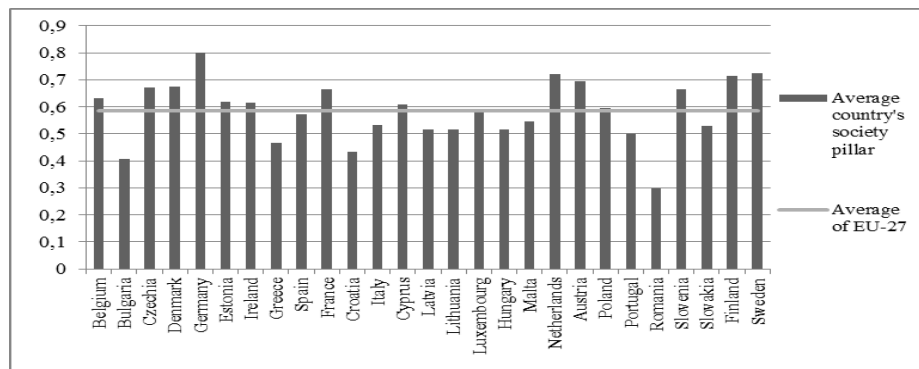

Figure 4. Society pillar of the Green Growth Index, 2018
Source: developed by the authors

As it can be seen in Figure 4, Belgium, Czechia, Denmark, Germany, Estonia, Ireland, France, Cyprus, Netherlands, Austria, Slovenia, Finland, and Sweden exceed the average of the Society pillar. The European Union countries are distributed between 0.3 and 0.8 according to the Society pillar of the Green Growth Index. The highest value (0.8) is in Germany; main factors for this achievement are related to low unemployment rate, high employment rate, high level of pupils enrolled in primary education rate, good healthcare and educational systems. The lowest society pillar value (0.3) is indicated in Romania. The highest rate of infant mortality, the biggest poverty gap and the lowest rate of access to improved water have led to such poor performance of Romania according to the Social pillar of the Green Growth Index.

In Figure 5, the average each country's Environment pillar and the average of the EU-27 countries are shown. The indicators included in the calculation of the Environment pillar vary widely between the European Union countries and, therefore, none of the countries have reached the Environment pillar value of 1. 16 European Union countries are above the average rate which accounts for 0.49. The European Union countries according to the Environment pillar of the Green Growth Index are distributed between 0.29 and 0.64. It should be noted that Belgium, Bulgaria, Czechia, Estonia, Cyprus, Latvia, Luxembourg, Hungary, Poland, Romania, and Slovakia did not reach the average of the environmental rate in 2018. The highest value (0.64) is in Lithuania, and the lowest (0.29) in Poland. The highest level of air pollution, low level of renewable resource use and low recycling rate of municipal waste are the main reasons why Poland is lagging behind the EU-27 average according to the Environmental pillar.
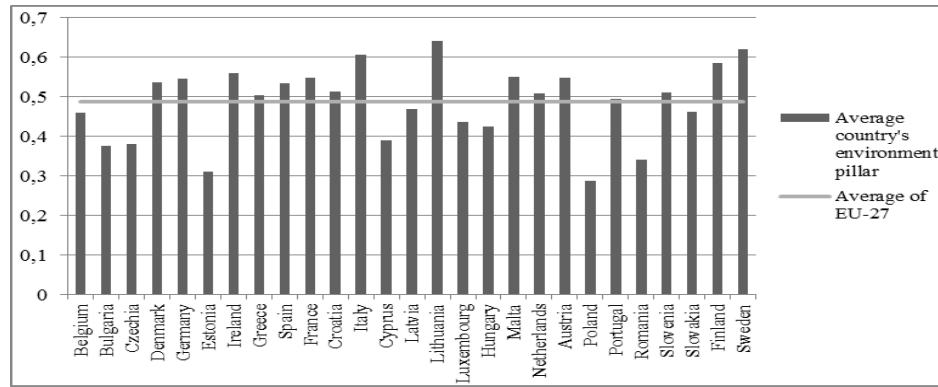
Figure 5. Environment pillar of the Green Growth Index, 2018
Source: developed by the authors

In overall measurement, the results of separate three pillars of each country have been accumulated. In Figure 6, the overall Green Growth Index for the European Union countries shows the main results of Green Growth evaluation of data of 2018.
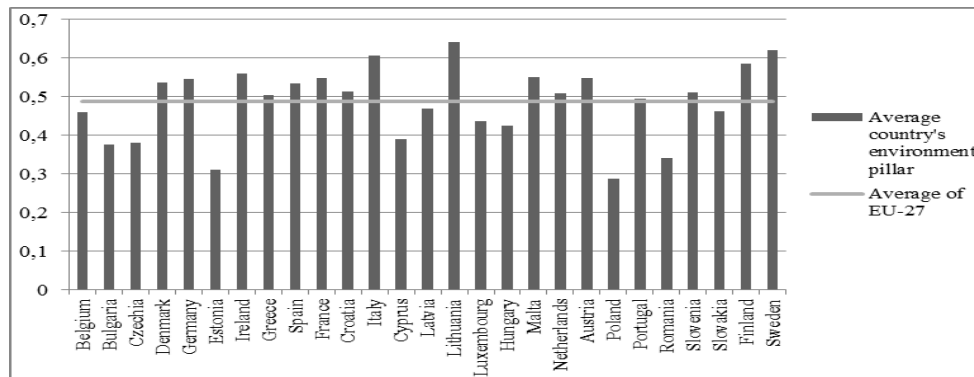

Figure 6. The Green Growth Index in the European Union countries, 2018
Source: developed by the authors

Among the countries in the sample of 2018, the lowest Green Growth Index is (0.38) in Romania and the highest (0.81) in Luxembourg. In order to provide the most comprehensive analysis of Green Growth Index, countries have been ranked on the basis of each pillar and overall index (see Table 3).

Table 3. Ranking of he European Union countries according to the pillars of Green Growth Index and the overall index

Country	Society pillar	Society pillar	Environment pillar	Overall GGI	Country	Society pillar	Society pillar	Environment pillar	Overall GGI
Belgium	25	10	19	22	**Lithuania**	12	21	1	10
Bulgaria	16	26	24	24	**Luxembourg**	1	15	20	1
Czechia	11	7	23	13	**Hungary**	5	22	21	14
Denmark	9	6	10	7	**Malta**	3	17	6	8
Germany	17	1	9	5	**Netherlands**	4	3	14	3
Estonia	8	11	26	16	**Austria**	10	5	8	6
Ireland	2	12	5	2	**Poland**	14	14	27	20
Greece	27	24	15	26	**Portugal**	23	23	16	25
Spain	22	16	11	19	**Romania**	21	27	25	27
France	24	8	7	17	**Slovenia**	7	9	13	9
Croatia	19	25	12	21	**Slovakia**	6	19	18	12
Italy	26	18	3	23	**Finland**	20	4	4	11
Cyprus	13	13	22	15	**Sweden**	15	2	2	4
Latvia	18	20	17	18					

Source: developed by the authors

As it is provided in Table 3, Luxembourg, Ireland, Netherlands, Sweden, and Germany perform the best according to Green Growth Index. Meanwhile, Romania, Greece, Portugal, Bulgaria, and Italy are among the worst according to this index. This is due to the fact that these countries underperform according to all three pillars of Green Growth Index.

To summarize, countries in regard to Green growth pillars – Economy, Society and Environment – differ according to Green Growth Index. Main reasons are: low economic growth and poor rates of environmental sustainability. It should be noted that countries' managing bodies should pay more attention to improve lagging indicators in order to achieve higher results in green growth ranking and evaluation.

Conclusions

The concept of green growth encompasses different notable variables, listed by various scientists and methodologies. The main reasons are: different context of country's policy, different level of country's socio-economic development, the existence of economic and environmental interdependencies.

Green growth can be stimulated by increased fiscal spending on public goods, government expenditures on education, increased spending on R&D and innovation process, environmental regulations, support for technology policies and consumer-awareness programs, fossil fuel scarcity, subsidies and tax incentive policies, building a green-finance system, economic openness and R&D scale, and other measures.

OECD, UNEP, Global Green Growth Institute and the Asian Development Bank have proposed a few frameworks for the evaluation of Green Growth indicator, however they include different indicators. The majority of scientists' proposed indices created to evaluate green growth are based on the principle of index assessment. It should be noted that international organizations' proposed indices are applied more widely than those that are proposed by scientists. In order to give a comprehensive and reliable insight, indices should be composed in an easy-to-understand and effective way; indicators included in index calculation should be widely used, measurable, comparable, and relevant.

The results of the Green Growth Index assessment show that green growth is uneven in the European countries; the Green Growth Index and all three pillars vary between countries due to the fact that several countries (Romania, Greece, Bulgaria, Portugal, and Poland) lag behind all the indicators included in the Green Growth Index. Meanwhile, Luxembourg, Ireland, Sweden, Malta, and Netherlands have achieved the highest level of green growth. The Green Growth Index can be widely applied to evaluate green growth in developing and developed countries and to compare the countries.

References

Adeel-Farooq, R.M., Abu Bakar, N.A., & Olajide Raji, J. (2018). Green field investment and environmental performance: A case of selected nine developing countries of Asia. *Environmental Progress and Sustainable Energy*, 37, 1085–1092. https://doi.org/10.1002/ep.12740

Asian Development Bank (2018). Inclusive green growth index: a new benchmark for quality of growth. Retrieved March 15, 2020 from https://www.greengrowthknowledge.org/sites/default/files/downloads/resource/Inclusive%2Bgreen%2Bgrowth%2Bindex_0.pdf

Bergius, M., Benjaminsen, T. A., & Widgren, M. (2018). Green economy, Scandinavian investments and agricultural modernization in Tanzania. *The Journal of Peasant Studies*, 45(4), 825-852. https://www.greengrowthknowledge.org/sites/default/files/downloads/resource/Inclusive%2Bgreen%2Bgrowth%2Bindex_0.pdf

Capasso, M., Hansen, T., Heiberg, J., Klitkou, A., & Steen, M. (2019). Green growth – A synthesis of scientific findings. *Technological Forecasting and Social Change* (2019), 146, 390–402. https://doi.org/10.1016/j.techfore.2019.06.013

Chang, K., Wan, Q., Lou, Q., Chen, Y., Wang, W. (2020). Green fiscal policy and firms' investment efficiency: New insights into firm-level panel data from the renewable energy industry in China. *Renewable Energy*, 151, 589–597. https://doi.org/10.1016/j.renene.2019.11.064

De Cian, E., Sferra, F. & Tavoni, M. (2016). The influence of economic growth, population, and fossil fuel scarcity on energy investments. *Climatic Change*, 136, 39–55. https://doi.org/10.1007/s10584-013-0902-5

Dornan, M, Morgan, W, Newton Cain, T, & Tarte, S. (2018). What's in a term? "Green growth" and the "blue-green economy" in the Pacific islands. *Asia & the Pacific Policy Studies*, 5, 408–425. https://doi.org/10.1002/app5.258

Du, H. S., Zhan, B., Xu, J., Yang, X. (2019). The influencing mechanism of multi-factors on green investments: A hybrid analysis. *Journal of Cleaner Production*, 239. https://doi.org/10.1016/j.jclepro.2019.117977

Elliott, C., & Zhang, L. Y. (2019). Diffusion and innovation for transition: transnational governance in China's green bond market development. *Journal of Environmental Policy & Planning*, 21(4), 391–406, https://doi.org/10.1080/1523908X.2019.1623655

Ferguson, P. (2015). The green economy agenda: business as usual or transformational discourse? *Environmental Politics*, 24(1), 17–37.

Gazzola, P., Del Campo, A. G., & Onyango, V. (2019). Going green vs going smart for sustainable development: Quo vadis? *Journal of Cleaner Production,* 214, 881–892.

Geisendorf, S., Klippert, C. (2017). The Effect of Green Investments in an Agent-Based Climate-Economic Model. *Environmental Modeling & Assessment,* 22, 323–343. https://doi.org/10.1007/s10666-017-9549-3

Gibbs, D., & O'Neill, K. (2017). Future green economies and regional development: a research agenda. *Regional Studies*, 51(1), 161–173.

Global Green Growth Institute (2018). Green growth index: concept, methods and applications. Seoul: Republic of Korea. Guo, L., Qu, Y., Wu, C., & Gui, S. (2018). Evaluating Green Growth Practices: Empirical Evidence from China. *Sustainable Development*, 26, 302–319. https://doi.org/10.1002/sd.1716

Guo, R., Lv, S., Liao, T., Xi, F., Zhang, J., Zuo, X., Cao, X., Feng, Z., & Zhang, Y. (2020). Classifying green technologies for sustainable innovation and investment. *Resources, Conservation and Recycling*, 153. https://doi.org/10.1016/j.resconrec.2019.104580

He, L., Zhang, L., Zhong, Z., Wang, D., & Wang, F. (2019). Green credit, renewable energy investment and green economy development: empirical analysis based on 150 listed companies of China. *Journal of Cleaner Production*, 208, 363–372.

Hickel, J. & Kallis, G. (2020). Is Green Growth Possible? *New Political Economy*, 25(4), 469–486, https://doi.org/10.1080/13563467.2019.1598964

Hille, E., Shahbaz, M., & Moosa, I. (2019). The impact of FDI on regional air pollution in the Republic of Korea: A way ahead to achieve the green growth strategy? *Energy Economics*, 81, 308–326. https://doi.org/10.1016/j.eneco.2019.04.004

Holroyd, C. (2014). Japan's Green Growth Policies: Domestic Engagement, Global Possibilities. *The Japanese Political Economy*, 40(3–4), 3–36. https://doi.org/10.1080/2329194X.2014.998590

Jänicke, M. (2012). "Green growth": from a growing eco-industry to economic sustainability. E*nergy Policy*, 48, 13–21.

Kararach, G., Nhamo, G., Mubila, M., Nhamo, S., Nhemachena, C., & Babu, S. (2018). Reflections on the Green Growth Index for developing countries: A focus of selected African countries. *Development Policy Review,* 36, O432– O454. https://doi.org/10.1111/dpr.12265

Kasztelan, A. (2017). Green growth, green economy and sustainable development: terminological and relational discourse. *Prague Economic Papers*, 26(4), 487–499. https://doi.org/10.18267/j.pep.626

Laibach, N., Börnera, J., Bröring, S. (2019). Exploring the future of the bioeconomy: an expert-based scoping study examining key enabling technology fields with potential to foster the transition toward a bio-based economy. *Technology in Society*. https://doi.org/10.1016/j.techsoc.2019.03.001

Li, J., Pan, S. Y., Kim, H., Linn, J. H., & Chiang, P. C. (2015). Building green supply chains in eco-industrial parks towards a green economy: Barriers and strategies. *Journal of Environmental Management*, 162, 158–170.

Lin, B., & Zhu, J. (2019). Fiscal spending and green economic growth: Evidence from China. *Energy Economics*, 83, 264–271. https://doi.org/10.1016/j.eneco.2019.07.010

Lindman, A., & Söderholm, P. (2016). Wind energy and green economy in Europe: measuring policy-induced innovation using paten data. *Applied Energy*, 179, 1351–1359.

Lyytimäki, J., Antikainen, R., Hokkanen, J., Koskela, S., Kurppa, S., Känkänen, R., & Seppälä, J. (2018). Developing Key Indicators of Green Growth. *Sustainable Development*, 26, 51–64. https://doi.org/10.1002/sd.1690

Loiseau, E., Saikku, L., Antikainen, R., Droste, N., Hansjürgens, B., Pitkänen, K., Leskinen, P., Kuikman, P., & Thomsen, M. (2016). Green economy and related concepts: an overview. *Journal of Cleaner Production*, 139, 361–371.

Mohamed, N., Maitho, E., Masvikeni, E., Fourie, R., Tilly, M., & Zondi, N. (2014). The Green Fund of South Africa: Origins, establishment and first lessons. *Development Southern Africa*, 31(5), 658–674, https://doi.org/10.1080/0376835X.2014.935295

Nahman, A., Mahumani, B. K., & de Lange, W. J. (2016). Beyond GDP: Towards a Green Economy Index. *Development Southern Africa*, 33(2), 215–233, https://doi.org/10.1080/0376835X.2015.1120649

Nasir, M. A., Huynh, T. L. D., & Tram, H. T. X. (2019). Role of financial development, economic growth & foreign direct investment in driving climate change: A case of emerging ASEAN. *Journal of Environmental Management*, 242, 131–141. https://doi.org/10.1016/j.jenvman.2019.03.112

Ngwenya, N., & Simatele, M. D. (2020). Unbundling of the green bond market in the economic hubs of Africa: Case study of Kenya, Nigeria and South Africa. *Development Southern Africa*, https://doi.org/10.1080/0376835X.2020.1725446

OECD (2011). Towards green growth: monitoring progress OECD indicator. Retrieved March 15, 2020, from https://www.oecd.org/greengrowth/48224574.pdf

Pahle, M., Pachauri, S., & Steinbacher, K. (2016). Can the Green Economy deliver it all? Experiences of renewable energy policies with socio-economic objectives. *Applied Energy*, 179, 1331–1341.

Pan, W., Pan, W., Hu, C., Tu, H., Zhao, C., Yu, D., Xiong, J., & Zheng, G. (2019). Assessing the green economy in China: An improved framework. *Journal of Cleaner Production*, 209, 680–691. https://doi.org/10.1016/j.jclepro.2018.10.267

Paroussos, L., Fragkiadakis, K. & Fragkos, P. (2019). Macro-economic analysis of green growth policies: the role of finance and technical progress in Italian green growth. *Climatic Change*. https://doi.org/10.1007/s10584-019-02543-1

Pearce, D., Markandya, A., & Barbier, E. (1989). *Blueprint for a green economy*. Earthscan: London, Great Britain.

Pieroni, M. P. P., McAlloone, T. C., & Pigosso, D. C. A. (2019). Business model innovation for circular economy and sustainability: a review of approaches. *Journal of Cleaner Production*, 215, 198–216.

Popa, O., Dina, G. C., & Martinc, C. (2011). Promoting the corporate social responsibility for a green economy and innovative jobs. *Procedia Social and Behavioral Sciences*, 15, 1020–1023.

Song, X., Zhou, Y., & Jia, W. (2019). How do Economic Openness and R&D Investment Affect Green Economic Growth?—Evidence from China. *Resources, Conservation and Recycling*, 146, 405–415. https://doi.org/10.1016/j.resconrec.2019.03.050

Swainson, L., & Mahanty, S. (2018). Green economy meets political economy: lessons from the "Aceh Green" initiative, Indonesia. *Global Environmental Change*, 53, 286–295.

UNEP (2011). Towards a green economy: pathways to sustainable development and poverty eradication. Retrieved March 15, 2020 from https://sustainabledevelopment.un.org/content/documents/126GER_synthesis_en.pdf

Wanner, T. (2015). The new "Passive Revolution" of the green economy and growth discourse: maintaining the "Sustainable Development" of Neoliberal capitalism. *New Political Economy*, 20(1), 21–41.

While, A., Jonas, A. E. G., & Gibbs, D. C. (2010). From sustainable development to carbon control: eco state restricting and the politics of urban and regional development. *Transactions of the Institute of British Geographers*, 35(1), 76–93.

World Bank (2012). Inclusive green growth: the pathway to sustainable development. Retrieved March 15, 2020 from http://siteresources.worldbank.org/EXTSDNET/Resources/Inclusive_Green_Growth_May_2012.pdf

Yaduma, N. (2018). Investigating the oil curse in OECD and Non-OECD oil-exporting economies using green measures of income. *Environment, Development and Sustainability*, 20, 2725–2745. doi.org/10.1007/s10668-017-0013-y

Yang, Y., Guo, H., Chen, L., Liu, X., Gu, M., & Ke, X. (2019). Regional analysis of the green development level differences in Chinese mineral resource-based cities. *Resources Policy*, 61, 261–272.

Zhang, B., & Wang, Y. (2019). The Effect of Green Finance on Energy Sustainable Development: A Case Study in China. *Emerging Markets Finance and Trade*, http://doi.org/10.1080/1540496X.2019.1695595

Zhu, X., Du, J., Boamah, K.B., & Long, X. (2020). Dynamic analysis of green investment decision of manufacturer. *Environmental Science and Pollution Research*, 27, 16998–17012. https://doi.org/10.1007/s11356-020-08144-1

Özbuğday, F. C., Fındık, D., Özcan, K. M., & Başçı, S. (2020). Resource efficiency investments and firm performance: Evidence from European SMEs. *Journal of Cleaner Production*, 252. https://doi.org/10.1016/j.jclepro.2019.119824

Agnė ŠNEIDERIENĖ is Lecturer, PhD, Klaipėda University, Lithuania. Research interests: green economy, corporate social responsibility, regional development, sustainability.
ORCID ID: https://orcid.org/0000-0002-3774-3153

Rasa VIEDERYTĖ is Associated Professor and Projects manager, PhD, Klaipėda University, Lithuania. Research interests: green economy, sustainable development, investments and projects management, industrial symbiosis, clustering.
ORCID ID: https://orcid.org/0000-0001-8339-2713

Lilita ABELE is Head of Environmental research center, Lecturer, Liepaja University, Latvia. Research interests: environmental sustainability, green growth, ecotechnologies, circular economy.
ORCID ID: https://orcid.org/0000-0001-8709-2363

_____

STRATEGIC MANAGEMENT OF HUMAN RESOURCES IN MODERN CONDITIONS: A CASE STUDY

Olga V. Tolstyakova[1], Nazygul T. Batyrova[2]

[1] *Higher School of Tariff Regulation, Plekhanov Russian University of Economics, 117997, 36 Stremiannyy Lane, Moscow, Russian Federation*
[2] *Higher School of Public Administration and Economics, Akhmet Yassawi International Kazakh-Turkish University, 161205, 29 B. Sattarkhanov Ave, Turkestan, Republic of Kazakhstan*

E-mails: [1] o.tolstyakova5646-2@uohk.com.cn; [2] naz.batyrova5187@tanu.pro

Abstract. The relevance of the subject matter is conditioned by the fact that human resources are an invaluable asset of any organisation, institution, or industrial enterprise. The purpose of the paper is to develop recommendations for managing human resources. The leading methods of researching the problems of the paper include the analysis of theoretical sources, the analysis of statistical indicators, and comparison. Analysis of statistical indicators plays a crucial role in the study, since data on human resource management can be directly obtained from statistical databases. The paper investigates the concept of human resources, the essence of human resource management, the functions of the HR service, analyses the management of human resources at Russian enterprises (in the Khanty-Mansi Autonomous Okrug and the Yamalo-Nenets Autonomous Okrug), identifies management problems, and develops solutions to them. An effective system of performance appraisal, remuneration, and wage structure will increase the effectiveness of the approach to managing human resources, and will lead to fundamental changes in the worldview of the company's management in relation to its human resources. The materials of the paper are of practical value for improving the management of human resources at Russian enterprises.

Keywords: training; potential; enterprise; globalisation; modern economy

1. Introduction

Human resources play a decisive role in the development of a modern economy. Human resource management (HR management) is a collective term for all formal systems created to help manage employees and other stakeholders within an enterprise. Starting with finding the right workforce and ending with retaining the best workforce, the HR service strives to make smart recruitment decisions through human capital analysis (Meena, & Parimalarani, 2019). The role of human resources management is to find the best way to increase enterprise productivity at the expense of its employees. The rational use of human resources of the enterprise allows more efficient use of equipment, machines, mechanisms, and as a result, production volumes, profit, and other economic indicators increase (Melnyk et al., 2019; Fedotov et al., 2018).

Despite the ever-increasing pace of change in the corporate world, the role of human resource management is unlikely to undergo dramatic changes. In recent years, several business tendencies have had a significant impact on human resources management. 21st century human resources management is becoming more efficient with the best use of technological advances (Reddy, & Lakshmikeerthi, 2017; Yessilov, & Kalashnikova, 2015). The main one is new technologies, especially in electronic communications, dissemination and information retrieval, which have radically changed the business landscape. Satellite communications, computers and network systems, fax machines and other devices – all this contributed to a change in the way enterprises interact with each other and their employees (Kerimov et al., 2018a; Kerimov et al., 2018b). For example, teleworking has become a very popular option for many employees, and human resource managers have had to develop new guidelines for this emerging subgroup of employees. Changes in the organisational structure have also affected the change in the nature of human resource management. In recent years, the number of trade unions in many industries has been declining, and organisational philosophy is changing. Many companies have abandoned or adjusted their conventional hierarchical organisational structures in favour of more flat management structures (Silagadze et al., 2019; Miethlich & Šlahor, 2018).

The third factor of change was the acceleration of the globalisation of the market. This phenomenon has led to increased competition for both customers and jobs. Enterprises began to demand higher results from their employees. Other factors that have changed the nature of human resource management in recent years include new managerial and operational theories, rapidly changing demographics, and changes in government employment laws (Yessilov, 2015; Lapidus et al., 2018a; Lapidus et al., 2018b). The role of the human resources management service is constantly increasing. Currently, businesses need people with a new mindset to cope with a changing global environment. There is a need for reengineering HR processes. Career planning needs to be clearly defined for employees. Management should also encourage employee participation in decision making. The theoretical significance of the paper lies in the study of the essential and substantial features of human resource management in the enterprise. The practical significance of the paper lies in proposing areas for improving the management of human resources in the enterprise. The theoretical framework of the paper comprises fundamental developments on the subject matter, which were presented in the works of domestic and foreign authors (Tretyakova et al., 2020).

Many authors paid addressed the issues of human resource management in the enterprise and suggested ways to solve them. S. Zeidan and N. Itani (2020) consider that human resources analysis is important for working with human resources, upon implementing which enterprises face a lack of skills in analysing personnel data, poor IT infrastructure and insufficient business investments. The interconnection and interaction of effective human resources management and strategic planning allow organisations to achieve maximum success (Stewart, & Brown, 2019). From the standpoint of D. Angrave and I. Kirkpatrick (2016), human resources management should consider both staff potential and shortcomings, HR service personnel should be involved in building an operational and strategic plan to develop better methods and approaches – in this case, the practice of working

with personnel will lead to transformational changes. However, the literature does not contain any relevant studies of the problems of human resource management in specific enterprises, which will be further discussed herein.

2. Literature Review

Resources form a part and a fundamental framework of the enterprise, since the enterprise cannot function without resource supply. The most important results of effective resource potential management are minimising the costs of their storage and management, timely provision of the necessary amount of resources for uninterrupted production and maximising the level of satisfaction of the needs of consumers of enterprise products.

The enterprise possesses various resources:

− material resources (items and means necessary for the smooth functioning of the production process);
− intangible resources (allow to develop and patent individual approaches to production management);
− technology (provides the conversion of material resources into goods);
− financial resources (provide the mobilisation of funds to start the production process);
− information resources (allow to exchange information between departments and with the external environment, allow to automate the management of various processes);
− innovative resources (allow to get product, technological and organisational advantages over competitors);
− human resources (personnel of the enterprise, which performs all basic functions);

Human resources, therefore, constitute an important component of enterprise resources, including staff and workforce capacity. According to Z.Yu. Pronina (2018), human resource management is the employment, development, promotion of people in organisations and the development of appropriate relations between management and employees. HR management is the activity on the optimal use of personnel to achieve the goals of the enterprise, on the formation of personnel policy, corporate culture, management of human resources behaviour, management of social and labour relations (Lapshova, 2020).

HR management is based on the following basic principles. Firstly, human resources are the most important assets of an enterprise, and their effective management is the key to success. Secondly, personnel policy and personnel processes should be associated with the achievement of corporate goals and strategic plans. Thirdly, the corporate culture and values, the organisational climate and managerial behaviour arising from the corporate culture influence the results of the entire enterprise. Fourthly, HR management is involved in integration – involving all members of the enterprise in organisational practice and working together with the understanding of common tasks to achieve the goals of the enterprise (Konyavsky & Ross, 2020; Bashynska, 2015).

The HR service develops programmes and activities aimed at helping meet both individual and organisational needs, goals, and objectives. With the help of human resources, it forms the appropriate corporate culture and implements programs that support the core values of the enterprise. Personnel workers study and analyse the environment, plan human resource requirements, recruit personnel in accordance with the needs of the enterprise, evaluate the labour behaviour of workers, establish compensation, improve working conditions, maintain effective labour relations (Dudin et al., 2016). Personnel workers aim at a qualitative improvement of the human resources of the enterprise, which are considered to be the most valuable assets (Miethlich & Oldenburg, 2019).

The responsibilities of HR management can be divided into three categories: individual, organisational, and career responsibilities. Individual management involves assisting staff in identifying their strengths and weaknesses, correcting deficiencies and making the best contribution to the development of the enterprise. These

responsibilities are carried out through various activities, such as validation, training and testing. Organisational development focuses on creating a successful system that maximises human (and other) resources as part of larger business strategies. This important responsibility also includes creating and managing a change program that allows the organisation to respond to changing external and internal influences. Finally, there is responsibility for managing career development. This entails the selection of people most suitable for certain jobs and the development of a career path within the enterprise (Frolova et al., 2020; Zatsepin et al., 2018).

The structures of HR services vary widely depending on the business, and are formed depending on the type, size, and guidelines of the enterprise. In recent years, staffing has changed due to internal organisational changes, as well as against the background of external changes (demography, globalisation, information technology) (Ben-Gal, 2019). Currently the HR service is considered not as an administrative unit of the enterprise, but as a strategic business partner. The determining factor in supporting the long-term functioning of the enterprise and its development in a changing economic environment is the use of a strategic approach. Building an effective personnel strategy in close integration with the overall corporate strategy of the enterprise constitutes the framework for creating a competitive advantage based on the main element of any enterprise – its human resources. Accordingly, the leadership of modern organisations is facing a vexed question of choosing an effective personnel strategy that would meet the challenges of a changing external environment, but at the same time maintain and strengthen the competitive advantages inherent in organisations (Mukhamadiyeva et al., 2018).

Each company has its own preferences in the use of personnel management tools. Authors such as G.J. Bamber et al. (2017) believe that the creativity and innovation of human resources help challenge old ways of thinking and find new solutions to current problems. According to D. Ulrich (2016), lately, special attention has been paid to such features of human resources as determination, engagement, and welfare. An effective motivation system is important to attract and retain staff. An interested employee is a productive employee, which means a more profitable employee. The physical presence of a person does not guarantee their effective work. Only being at the workplace at their own free will and desire, the employee will make maximum effort, and not seek interest in other activities. It is motivation that drives human reserves. Labour motivation forms an integral part of the human resources management system, which constitutes a set of incentives that determine the main parameters of labour activity (Gorelov et al., 2016; Akizhanova et al., 2018).

Motivation can be material and non-material. Recently, the methods of motivation that produce results are as follows: bonus depending on the results of the work, holding contests, rewarding staff, financial support, conducting surveys, providing more freedom and flexibility in work, creating comfortable working and relaxing conditions, healthcare. For example, the founder of Radioactive Public Relations decided to try a four-day work week without reducing staff salaries. Six months later, the results spoke for themselves – the agency continued to conquer a new business, staff retention remained at 100%, and the number of sick days was reduced by 75%. Business revenue has more than doubled every year (Goodall, 2019). Mountain View organisation (California) pays special attention to the workplace environment – the campus area resembles old subway cars, there are conference rooms decorated in Broadway style. Google allows its software developers to design their own desktops or desktops made of what looks like huge Tinker toys. While some engineers have fixed tables, some others have additional treadmills that allow them to walk while working (Luenendonk, 2014).

3. Materials and Methods

The main method used in the analysis of human resource management is the analysis of statistical indicators. Large companies publish information on personnel and social policies and personnel statistics on their websites; the author selects the following indicators: staffing levels; staff turnover; number of employees taking part in training events; skill level of employees; staffing level. With that, to calculate individual indicators, it is necessary to study data for several years (those indicators were considered, that were available in the annual reports of

individual companies under study). As the empirical framework of the study, we selected indicators for human resource management of companies located in the Yamalo-Nenets Autonomous Okrug and the Khanty-Mansi Autonomous Okrug.

It is important to describe the enterprises of the Yamalo-Nenets Autonomous Okrug and the Khanty-Mansi Autonomous Okrug. Khanty-Mansi Autonomous Okrug is a large oil and gas region of the Russian Federation and one of the largest oil-producing regions in the world. Yamalo-Nenets Autonomous District ranks 1st in Russia in terms of production of natural gas and gas condensate, oil is also produced here. The vast majority of successful companies in the Khanty-Mansi Autonomous Okrug and the Yamalo-Nenets Autonomous Okrug represent the oil and gas industry, gas and oil transport, and equipment for this industry.

The study of the problem was carried out in three stages:

– at the first stage, a theoretical analysis of the existing methodological approaches to the analysis of human resource management was carried out, statistical indicators were selected for analysis;
– at the second stage, the selected indicators were studied in dynamics, indicators for different enterprises were compared;
– at the third stage, general conclusions were drawn regarding human resource management at enterprises of the Tyumen region, proposals were developed to change the situation for the better.

4. Results

We shall consider the features of human resource management on the example of individual enterprises of the Tyumen region: UTEC-Koda JSC, Rosseti PJSC, Tyumen Rosseti JSC (formerly Tyumenenergo JSC until 2019), Surgutneftegaz PJSC. In UTEK-Koda JSC (Khanty-Mansi Autonomous Okrug) personnel work includes the processes of selection, fitting, hiring, placement, motivation, and staff training. The average headcount is 130 people (according to data for 2019). If we consider the management of personnel motivation at UTEC-Koda JSC, then the following methods of stimulating employees were developed there:

− employees receive cash compensation in honour of a professional holiday (Power Engineers' Day) in an amount that depends on the financial situation at the enterprise;
− at the birth of a child, financial aid is provided in the amount of 10 thousand roubles;
− on birthday – 50 years, and then every 5 years a paid day off is provided and 10 thousand roubles are given out as material aid;
− upon reaching 30, 35, 40, 45 years, 5 thousand roubles are given;
− one of the family members of the deceased employee of the enterprise (due to disease, accident not at work) is aided 15 thousand roubles;
− reimbursement of the burial expenses in case of death of an employee as a result of a production-related accident, as well as the death of a disabled person resulting from a work injury at the enterprise or occupational disease, at the lowest rates, but not exceeding 25 thousand roubles;
− in case of death of close relatives, financial aid is allocated to employees of the enterprise in the amount of 10 thousand roubles;
− in cases of natural disasters, emergencies, fires, floods, etc., financial aid is allocated to employees – 25 thousand roubles;
− the costs of preschool education are compensated to parents (employees of the enterprise);
− transport expenses (excluding taxis) are paid to employees for travel to the place of vacation within the territory of the Russian Federation and back;
− in case of retirement, lump-sum benefits are paid: for work experience of up to 10 years – twice the size of the allowance, calculated from the average monthly income, from 10 to 15 years – three times, from 15 to 20

years – four times, over 20 years – five times;
−   parents with children under 17 years old are given New Year gifts.

For the purpose of additional motivation, an honour board has been posted on the company's website, and additional medical insurance is provided. One of the important indicators of the integrity and stability of an organisation is staff turnover. A low staff turnover rate indicates a high level of social security of employees and an effective approach to personnel management. We shall consider the dynamics of staff turnover in JSC "UTEC-Koda" in Figure 1.
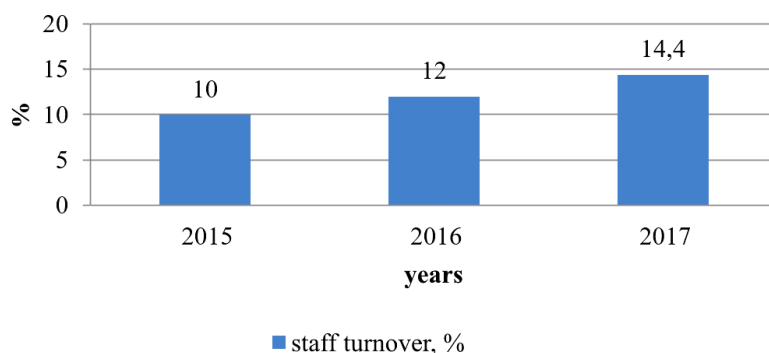

■ staff turnover, %

Fig. 1. The dynamics of staff turnover in UTEC-Koda JSC in 2015-2017, %

Source: compiled by the author based on data from (Media Information, 2020).

According to available data obtained from the annual reports of UTEC-Koda JSC for 2015-2017 we can conclude that the level of turnover in this company is high and increased annually in the analysed period. That is, the measures taken regarding human resources management in this company are not enough to retain employees. We shall compare staff turnover at UTEK-Koda JSC with the same indicator at Rosseti PJSC (Fig. 2).
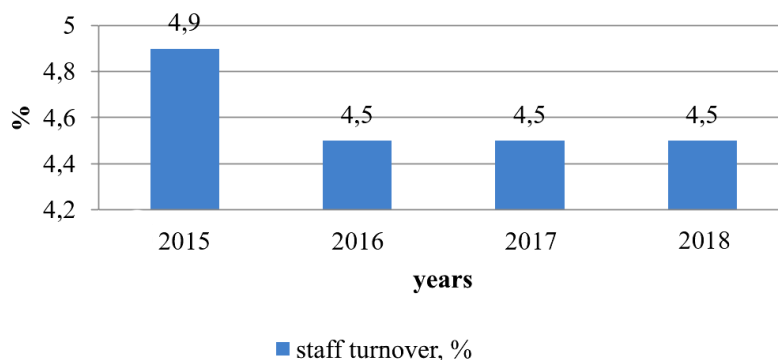
■ staff turnover, %

Fig. 2. The dynamics of staff turnover in JSC "Rosseti" in 2015-2018,%

Source: compiled by the author based on data from (Company's News, 2020).

This company is much larger than UTEC-Koda JSC. The average number of employees of PJSC Rosseti in 2018 amounted to 217 thousand people (including the number of JSC ROSSETI Tyumen over 7 thousand people). The staff turnover in this company in 2015 was 4.9%, and in 2016-2018 was at the level of 4.5%. This level of turnover is in line with the standard and its decrease is a positive fact. The functions of the HR service of PJSC Rosseti include: workforce planning, selection, performance appraisal, salary administration, training,

development, provisioning, assessment, dismissal. To professionally evaluate the competence and potential of the chief engineers of the subsidiaries and affiliates of PJSC Rosseti, comprehensive assessment activities are regularly carried out with regard to the heads of technical units to the level of electric grid areas (for example, in 2018, over 2 thousand people were evaluated). At all levels of management, a personnel reserve is created. In 2018, the number of updated personnel reserves of subsidiaries and affiliates for senior positions totaled about 15 thousand people. About 70% of appointments to managerial positions are secured by internal candidates. We shall consider the dynamics of the share of employees with professional education and the level of staffing in 2015-2017 in JSC "Rosseti Tyumen" in Figure 3.

Fig. 3. Dynamics of the share of employees with professional education and staffing levels in 2015-2017, %
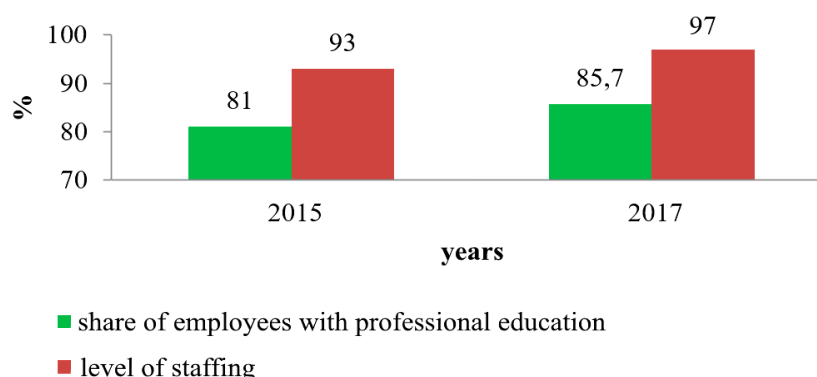
Source: compiled by the author based on data from (Energy News, 2020).

The employees of Rosseti Tyumen JSC noted a high level of staff qualification – in 2017, 85.7% of employees had professional education. This indicator has increased by 4.7 percentage points since 2015. The staffing level of JSC Rosseti Tyumen during 2015-2017 was maintained at a fairly high level of not less than 97%, compared to 2015, the growth was 4 percentage points. The methods of incentives in the company include: establishing a high level of wages, establishing the dependence of wages on the level of productivity and on achieving performance targets, the dependence of wages on the conditions of production activities, promotion of state, industry and corporate awards, assistance in improving housing conditions, additional insurance, organisation of cultural and sports events for employees and their families, etc.

The company has adopted the Digital Transformation 2030 Concept, in accordance with which digital projects have already been implemented in the area of interaction with personnel: conducting evaluation activities with the use of remote testing forms, launching a project to unify and automate HR management business processes aimed at implementing the platform providing a digital format for all personnel processes, which will allow for monitoring and development of the company's work throughout the country. The system of training, retraining, and advanced training is important at all enterprises of the oil and gas industry (Guliyev et al., 2017).

For example, in 2017, employees of UTEK-Koda JSC attended the following advanced training courses: "Civil defence and protection against natural and anthopogenic emergencies", "Labour protection for managers and specialists", "Fire Safety Basics for managers (FSB) and those responsible for fire safety", "Electrical safety", "Electrician for testing and measuring of 4th category". For the following programmes: "Activities in "Preparation and presentation of financial statements of a business entity", "Software Engineer", "Technosphere Security", attended the following seminars: corporate seminar-workshop "On recognition of accounting regulations by federal standards (FSBU). Other relevant changes in the regulatory and legislative framework in

accounting", "Installation of VLI-0.4 kV, VLZ-6/10 kV with ABC cables. Installation of cable joints 1-35 kV. Innovations in the electric power industry"; workers took part in the electrical engineering forum.

In 2018, Rosseti PJSC received 132 thousand employees or 61% of the total number of employees trained in 2018, in 2016 this indicator was 50%, and in 2017 – 58.7%. That is, there is an annual increase in the number of trained personnel. If we consider the educational activities implemented with the use of training simulators and remote forms of self-training, then the total coverage of employees with training programmes constitutes 100%. We shall analyse the training of personnel at JSC Rosseti Tyumen in 2017-2018 (Table 1).

Table 1. Analysis of personnel training at JSC Rosseti Tyumen in 2017-2018

Indicator	2017	2018	Absolute change
Number of employees taking part in training events, people	3,597	3,659	62
The total number of staff	7,418	7,375	-43
The share of employees taking part in training events in the total number of staff, %	48.5	49.6	1.1

Source: compiled by the author based on data from (Energy News, 2020).

The number of employees taking part in training events at JSC Rosseti Tyumen in 2017-2018 increased by 62 people, the share of employees taking part in training events in the total number of personnel increased by 1.1 percentage points, although in comparison with PJSC ROSSETI it is much lower. Next, we shall analyse the training of personnel at Surgutneftegaz PJSC in 2017-2018 (Table 2).

Table 2. Analysis of staff training at Surgutneftegaz PJSC in 2017-2018

Indicator	2017	2018	Absolute change
Number of employees taking part in training events, people	31	33.3	2.3
The total number of staff	113.6	112.8	-0.8
The share of employees taking part in training events in the total number of staff, %	27.3	29.5	2.2

Source: compiled by the author based on data from (PJSC "Surgutneftegas", 2020).

The number of employees taking part in training events at Surgutneftegaz PJSC in 2017-2018 increased by 2.3 thousand people, the share of employees taking part in training events in the total number of personnel increased by 2.2 percentage points, although in comparison with PJSC Rosseti and JSC Rosseti Tyumen it is much lower – only a third of employees annually improve their level of professional knowledge (Kerimov et al., 2019).

As for the personnel policy in Surgutneftegaz PJSC, the company has a comprehensive system of employee motivation, developed with consideration of strategic objectives of the Company. Motivation tools here include: annual indexation of wages, encouragement (once a year and once a quarter) for the performance of production and technical and economic indicators, bonuses for the performance of especially important tasks, rationalisation work, import substitution, and development of new technologies. Surgutneftegaz PJSC organises "Best in Profession" professional contests and drill crew competitions. This contributes to an increase in the efficiency of employees, helps to creatively address current production matters.

Discussion

Having analysed the management of human resources at the enterprises of the Tyumen region, we can draw certain conclusions:

1. In UTEC-Koda JSC, personnel work includes the processes of selection, fitting, hiring, placement, motivation, and staff training. The company has developed a considerable number of ways of motivation: staff at the enterprise are motivated by provision of financial aid in difficult life situations, allocation of rewards on individual holidays, parents are compensated for the costs of preschool education and New Year gifts are presented, corporate trips, leisure trips are organised, photos of advanced workers are placed on the board of honour, the possibility of additional medical insurance is in place. The company has developed a continuing education program. However, despite the measures taken in relation to human resource management, for 2015-2017, the turnover rate in this company was high and increased annually during the analysed period.

2. The functions of the HR service of PJSC Rosseti include: workforce planning, selection, performance appraisal, salary administration, training, development, provisioning, evaluation, dismissal. The company has adopted the Concept "Digital Transformation 2030", in accordance with which digital projects have already been implemented in interaction with personnel. In this company, low staff turnover is noted over several years, which proves the effectiveness of the ongoing personnel policy.

3. Rosseti Tyumen JSC is part of Rosseti PJSC. The employees of this company have a high level of qualification and a high level of staffing. The company established high salaries, which depend on the level of productivity, on the achievement of performance targets, on conditions of production; employees are encouraged by state, industry, and corporate awards.

4. PJSC Surgutneftegaz has a comprehensive employee motivation system developed with consideration of strategic objectives of the company. Motivation tools here include: annual indexation of wages, bonuses for performing production and technical and economic indicators, bonuses for performing especially important tasks, work on improvement by modification, import substitution, mastering of new technologies, professional skills contests are held. A third of employees annually increase their level of professional knowledge.

The analysis results suggest that in individual companies, mainly in larger ones, the level of staff turnover is lower, which can be explained by a more thought-out policy regarding personnel. In those companies where most of the staff is covered by training programs and digital projects are used in personnel policy, the staff works more stably, contributing to the development of the company. As for the development of improving human resource management, various authors express different opinions. According to N.P. Romanova (2019), it is necessary to study systematically the claims of employees with a view to the rational use of human potential, as there is a correlation between job satisfaction and labour productivity. E. Zavyalova et al. (2017) believe that it is necessary to involve personnel in strategic goal-setting and corporate decision-making, to develop channels of internal and external communication, to provide regular feedback on the performance of employees of all levels, to apply modern methods of personnel assessment, to stimulate various forms of long-term employment (for example, guarantees of a share of profit from the activity of an enterprise).

The authors think that in order to improve the management of human resources at enterprises, the following is necessary: to use digital technologies at all stages of working with personnel, which will improve the efficiency of personnel processes (automate personnel selection, training, assessment, analysis of the reasons for dismissal); it is necessary to study the information on the potential of employees in full detail and use it to achieve the goals of the enterprise; to form a personnel reserve for all employees, and not just for managers; widely introduce intangible instruments of motivation (awards, acknowledgements, flexible work schedule, etc.), accept students for internships, hold open days to form a positive image of the enterprise. Thus, enterprises have the resources and opportunities to improve human resource management. This requires the use of modern tools in the personnel field. Currently, part of the enterprises more successfully manages personnel, another part – less so. Basically, the larger the enterprise, the better its HR management is developed – more motivation tools are applied, the majority

of personnel processes are computerised – as a result, personnel at such enterprises are more stable (low staff turnover).

Conclusions

Summarising the results, we can draw certain conclusions. The organisation's human resources constitute one of its largest investments. Human resources constitute the totality of all components (skills, creative abilities) that employees of an enterprise possess. It is the personnel who are responsible for the growth and prosperity of the enterprise, therefore, they need to be treated with attention to maximise their potential in the interests of the enterprise. The efficient use of human resources in an organisation depends on the effective management of human resources. The main responsibilities related to human resource management include: analysis of work and staffing, organisation and use of the workforce, measuring and evaluating the effectiveness of the workforce, introducing employee remuneration systems, professional development of employees, and maintaining the workforce.

The main issues identified in the course of the analysis of indicators describing human resource management at individual enterprises of the Tyumen region (in the Khanty-Mansi Autonomous Okrug and the Yamalo-Nenets Autonomous Okrug) are as follows: high turnover of staff and its growth were noted at UTEC-Koda JSC; at Surgutneftegaz PJSC, only the third part of the employees annually increase their level of professional knowledge (in PJSC Rosseti – 61%, in JSC Rosseti Tyumen – 49.6%); not all enterprises link HR policies with the Strategy of the enterprise, not all use digital technologies in HR work. Considering the identified issues, recommendations were developed to improve the situation in personnel management. The author's position on improving human resource management is as follows. It is necessary to use digital technologies to a greater extent in personnel work; maximise the study of information on the potential of employees; form a personnel reserve for all employees; widely introduce intangible motivation tools, work with students and schoolchildren (open days, internships).

Adding together all of the above, it should be noted that further studies are required to improve the efficiency of human resource management in enterprises. Currently, individual scientists are studying the nature and features of human resource management, however, the specifics of personnel management and its potential at particular Russian enterprises remain understudied. The most promising direction for further research on the subject matter is to study the experience of leading companies in developed countries, which will help to decide what mechanisms should be applied at Russian enterprises to improve human resource management.

References

Akizhanova, D.M.; Satenova, S.K.; Seitova, S.B.; Tulegenova, A.M.; Kaliyeva, S.E. 2018. Universal and culture-specific keywords in business discourse, *Papers on Language and Literature*, 54(1): 57-64.

Angrave, D.; Kirkpatrick, I. 2016. HR and analytics: Why HR is set to fail the big data challenge, *Human Resource Management Journal*, 26: 1-11.

Bamber, G.J.; Bartram, T.; Stanton, P. 2017. HRM and workplace innovations: Formulating research questions, *Personnel Review*, 46(7): 1216-1227.

Bashynska, I.O. 2015. Using the method of expert evaluation in economic calculations, *Actual Problems of Economics,* 7(169): 408-412.

Ben-Gal, H.C. 2019. An ROI-based review of HR analytics: Practical implementation tools, *Personnel Review*, 48(6): 1429-1448.

Company's News. 2020. https://www.rosseti.ru

Dudin, M.N.; Lyasnikov, N.V.; Senin, A.S.; Sepiashvili, E.N.; Sidorenko, V.N.; Tolmachev, O.M. 2016. *Human resource management*.

Moscow: Elit.

Energy News. 2020. https://www.te.ru

Fedotov, A.M.; Murzakhmetov, A.N.; Dyusembaev, A.E. 2018. Expansion of ideas and processes in social and biological communities, *Eurasian Journal of Mathematical and Computer Applications,* 6(4): 17-28.

Frolova, Y.; Sakulyeva, T.; Hammam, K. 2020. The relationship between corporate responsibility and the performance of the company, *Opcion,* 36(Special Edition 27): 1134-1150.

Goodall, O. 2019. *Staff motivation: Techniques, examples and quotes from SMEs*. https://realbusiness.co.uk/staff-motivation-techniques-examples-quotes/

Gorelov, N.A.; Kruglov, D.V.; Melnikov, O.N. 2016. *Human resource management: A modern approach*. Moscow: Yurait.

Guliyev, I.S.; Kerimov, V.Yu.; Osipov, A.V.; Mustaev, R.N. 2017. Generation and accumulation of hydrocarbons at great depths under the earth's crust, *Socar Proceedings,* 1: 4-16.

Kerimov V.Y.; Leonov M.G.; Osipov A.V.; Mustaev R.N.; Khai V. 2019. Hydrocarbons in the basement of the South China Sea (Vietnam) shelf and structural-tectonic model of their formation, *Geotektonika,* 53(1): 42-59.

Kerimov, V.; Rachinsky, M.; Mustaev, R.; Serikova, U. 2018a. Geothermal conditions of hydrocarbon formation in the South Caspian basin, *Iranian Journal of Earth Sciences,* 10(1), 78-89.

Kerimov, V.Yu.; Mustaev, R.N.; Osipov, A.V. 2018b. Peculiarities of hydrocarbon generation at great depths in the crust, *Doklady Earth Sciences,* 483(1): 1413-1417.

Konyavsky, V.; Ross, G. 2020. New method for digital economy user's protection, *Lecture Notes in Networks and Systems,* 78: 221-230.

Lapidus, A.L.; Kerimov, V.Yu.; Mustaev, R.N.; Movsumzade, E.M.; Salikhova, I.M.; Zhagfarov, F.G. 2018a. Natural bitumens: physicochemical properties and production technologies, *Solid Fuel Chemistry,* 52(6): 344-355.

Lapidus, A.L.; Kerimov, V.Yu.; Tret'yakov, V.F.; Talyshinskii, R.M.; Ilolov, A.M.; Movsumzade, E.M. 2018b. Extraction of Asphaltite with toluene, *Solid Fuel Chemistry,* 52(4): 256-259.

Lapshova, O.A. 2020. *Human resource management*. Moscow: Yurait.

Luenendonk, M. 2014. *The Google way of motivating employees*. https://www.cleverism.com/google-way-motivating-employees/

Media Information. 2020. https://www.yutek-koda.ru

Meena, R.; Parimalarani, G. 2019. Human capital analytics: A game changer for HR professionals, *International Journal of Recent Technology and Engineering*, 8: 3963-3965.

Melnyk, N.; Bidyuk, N.; Kalenskyi, A.; Maksymchuk, B.; Bakhmat, N.; Matviienko, O.; Matviichuk, T.; Solovyov, V.; Golub, N.; Maksymchuk, I. 2019. Models and organisational characteristics of preschool teachers' professional training in some EU countries and Ukraine, *Zbornik Instituta za Pedagoska Istrazivanja,* 51(1): 46-93.

Miethlich, B.; Oldenburg, A.G. 2019. Social inclusion drives business sales: A literature review on the case of the employment of persons with disabilities. *Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020.* April 10-11, Granada, Spain, 6253-6267.

Miethlich, B.; Šlahor, Ľ. 2018. Creating shared value through implementing vocational rehabilitation in the corporate social responsibility strategy: A literature review. *Proceedings of the 32nd International Business Information Management Association Conference, IBIMA 2018 - Vision 2020: Sustainable Economic Development and Application of Innovation Management from Regional expansion to Global Growth.* November 15-16, Seville, Spain, 1444-1460.

Mukhamadiyeva, G.N.; Kalkayeva, N.; Bopabaev, E.C.; Sailibayeva, Z.Y.; Khamzina, Z.A.; Buribayev, Y.A. 2018. Evolution of labor law in Kazakhstan: Overview and commentary on regulatory objectives and development, *Journal of Advanced Research in Law and Economics,* 9(8): 2664-2674.

PJSC "Surgutneftegas". 2020. https://www.surgutneftegas.ru

Pronina, Z.Yu. 2018. Economics of knowledge: From human resource management to human capital management, *Eurasian Scientific Association*, 4: 109-111.

Reddy, P.R.; Lakshmikeerthi, P. 2017. HR analytics – An effective evidence based HRM tool, *International Journal of Business and Management Invention*, 6(7): 23-34.

Romanova, N.P. 2019. Human resource management as a form of using human potential, *Bulletin of Transbaikal State University*, 2: 88-95.

Silagadze, A.; Atanelishvili, T.; Silagadze, N. 2019. *Economic doctrines: the origins*. Hauppauge: Nova Science Pub Inc.

Stewart, G.L.; Brown, K.G. 2019. *Human resource management.* New York: Wiley.

Tretyakova, N.V.; Lyzhin, A.I.; Chubarkova, E.V.; Lukiyanova, M.N. 2020. Focus on practical disciplines as a method of developing entrepreneurial mindset, *Journal of Entrepreneurship Education*, 23(1): 1-9.

Ulrich, D. 2016. HR at a crossroads, *Asia Pacific Journal of Human Resources*, 54(2): 148-164.

Yessilov, A. 2015. Social work with immigrants in Kazakhstan as means of prevention of the social conflicts in society, *Mediterranean Journal of Social Sciences,* 6(5): 259-264.

Yessilov, A.B.; Kalashnikova, N.P. 2015. Technology of social work with elderly migrants: International experience and Kazakhstan practice, *Advances in Gerontology*, 5: 322-326.

Zatsepin, A.M.; Zatsepin, M.N.; Filippova, O.V.; Allalyev, R.M.; Fatkullina, A.A. 2018. The influence of addiction to gambling on the civil capacity of citizens, *European Research Studies Journal,* 21(4): 588-599.

Zavyalova, E.; Kucherov, D.; Tsybova, V. 2017. Human resources management in Russian companies – leaders of the global economy. *Foresight*, 11(4): 52-61.

Zeidan, S.; Itani, N. 2020. HR analytics and organizational effectiveness. *International Journal on Emerging Technologies*, 11(2): 683-688.

Olga V. TOLSTYAKOVA
ORCID ID: https://orcid.org/0000-0003-4871-8209

Nazygul T. BATYROVA
ORCID ID: https://orcid.org/0000-0002-6964-6200

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

_____

ENTREPRENEURSHIP AND SUSTAINABILITY CENTER
Publisher
http://jssidoi.org/esc/home

EVALUATION OF THE EFFECTIVENESS OF INSOLVENCY FRAMEWORKS: DOES THE SMALL BUSINESS PERSPECTIVE MATTER?

Salvija Mulevičienė

Mykolas Romeris Law School, Mykolas Romeris University, Ateities st. 20, 08303 Vilnius, Lithuania

E-mail: salvija@mruni.eu

Abstract. The exit of business from the market based on the rules of sound insolvency law is a necessary condition for economic growth. Effective insolvency frameworks encourage entrepreneurship. Currently insolvency laws in many countries are designed with the complexity of medium sized or even large companies in mind, but businesses are very heterogeneous in their characteristics and performance. This paper highlights the importance of taking into account the perspective of individual entrepreneurs, micro, and small enterprises (IMSE) when designing insolvency frameworks. It summarizes the theoretical and empirical literature on the objectives of insolvency law, discusses the unique challenges encountered by IMSEs when facing insolvency, and analyses international standards with the aim of discerning whether the existent instruments offer adequate guidance for policy reforms when designing effective insolvency frameworks and taking into account the needs of small businesses. The aim of this paper is to analyse the specific challenges of insolvent small business: individual entrepreneurs, micro, and small enterprises, and to consider whether existing international standards provide policy makers with sound guidelines and directions for the development of modern national insolvency frameworks that adequately address the needs of small businesses.

1. Introduction

Entrepreneurship and self-employment are recognised as the key enablers of smart, sustainable, and inclusive growth (United Nations, 2017; European Commission, 2012). Growth and productivity need to be supported by competitive and efficient markets, and structural reforms that remove bottlenecks in the business environment (European Commission, 2019). A conducive business environment, including institutional and regulatory settings, is essential to incentivise risk-taking and experimentation by entrepreneurs, and foster business growth potential (OECD, 2018). Evidence suggests that the exit of firms from the market based on the sound insolvency law rules is a necessary condition for economic growth, and effective insolvency frameworks may in fact encourage greater entrepreneurial activity and new firm creation (Cirmizi, Klapper, & Uttamchandani, 2010; McGowan & Andrews, 2016). At the level of European Union (EU) policy, effective insolvency frameworks are also singled out as one of the most important determinants of a Member State's business environment in that regard (European Commission, 2019). At the scientific level, it has long been recognised that when innovative activity in an industry increases, firms' overall survival rates often decrease, but those that do survive tend to be stronger (Nickell, 1996; Klapper, Laeven, & Rajan, 2006; Cirmizi et al., 2010). As highlighted in the recent report of the Organisation for Economic Co-operation and Development (OECD) which introduces the new indicators on the measurement of the effectiveness of insolvency regimes, in the long-run productivity growth is sustained, inter alia, by firms' experimentation with new ideas and the **reallocation** of scarce resources to their most productive uses. So reviving productivity growth will, in part, depend on policies that effectively facilitate the exit or restructuring of weak business (OECD, 2018a) – in other words, on effective insolvency frameworks.

Furthermore, insolvency frameworks have an important secondary effect on entrepreneurship, as many entrepreneurs do not start a company because of their fear of the consequences of business failure. According to the results of the Flash Eurobarometer Survey No. 354 "Entrepreneurship in the EU and Beyond"—which covered the 27 countries currently comprising the EU as well as 13 countries from outside the EU—the fear of bankruptcy and the fear of losing their own home are indicated as the main fears held by the majority of the respondents in starting their own business in Europe (EU Directorate-General for Communication, 2015).

Additionally, insolvency frameworks are of increasing importance not merely in their own right but also because insolvency impinges on a host of other sectors such as the fields of employment, tort, environmental, pension, and banking law. It is essential, therefore, that the development of insolvency law proceeds with a sense of purpose. If lacking a sense of direction, this area of law is liable to be marked by inconsistencies of reasoning and failures of policy (Finch, 1997).

Currently, despite wide-ranging insolvency reforms in many countries, the complexity of regulation, high compliance costs, and ineffective insolvency regimes remain major obstacles to entrepreneurial activity. Upon first glance at this huge array of comparative information, it is clear that the design of each insolvency regime varies significantly across countries (McGowan & Andrews, 2018). However, one general feature can be distinguished: in many countries insolvency laws are designed with the complexity and sophistication of medium sized or even large companies in mind (The World Bank, 2017; Mokal et al., 2018), but the businesses are very heterogeneous in their characteristics and performance. Under the same label of *business* fall individual entrepreneurs, micro enterprises, and small enterprises (together – IMSE), which are vastly different from medium sized companies and the large international firms in relation to employees, access to finances, professional management services, and liability.

Despite the diversity and complexity of the characteristics of small business, until now there has been only little academic research on the effect of insolvency frameworks on IMSEs. But there is a growing awareness that the treatment of small business in insolvency is one of major bottlenecks of the insolvency frameworks (Mokal et al., 2018; Madaus, 2017; Bergthaler, Kang, Liu, & Monaghan, 2015). At the EU level, the EU Entrepreneurship 2020

Action Plan also states that the support measures for small business remain unbalanced, with a substantial number of EU Member States still neglecting to take into account the characteristics of small businesses, in particular micro-businesses, when designing legislation, or not facilitating a second chance for honest bankrupt entrepreneurs (European Commission, 2012). Therefore, national policy makers are advised to assess national insolvency laws applicable to small businesses in the light of good practices (e.g., European Commission, 2000), and when initiating reforms to look for guidance and direction from international expert organisations and best practices examples from other countries.

Only recently are some efforts being seen at the international, regional, and national levels to discuss in more detail the need to find solutions tailored to the specific needs of financially distressed IMSEs, aiming at allowing deserving IMSEs to restart entrepreneurial activities in the light of the broad impact of IMSEs insolvency on job preservation, the supply chain, entrepreneurship, and the economic and social welfare of society (e.g., UNCITRAL, 2020; OECD, 2018a). These discussions started to evolve from the initial question of whether the standards for effective business insolvency, as developed by influential international organisations, are appropriate when applied to a wider group of small and medium sized enterprises, and specifically to the question of whether they are suitable for IMSEs at all taking into account their specific nature. In a recent report, researchers from the United Nations Commission on International Trade Law (UNCITRAL) stated that standard business insolvency processes, where they are costly, complex, lengthy, and procedurally rigid, may be unavailable, prohibitive, or unsuitable for IMSEs. Burdened by unresolved financial difficulties and old debt, IMSEs may be discouraged from taking new risks, may become trapped in a cycle of debt, or may be driven to the informal sector of the economy (UNCITRAL, 2020).

Therefore, the aim of this paper is to analyse the specific challenges of insolvent small business: individual entrepreneurs, micro, and small enterprises, and to find out whether existing international standards provide the policy makers with sound guidelines and direction for the development of modern national insolvency frameworks that adequately address the needs of small businesses.

In order to achieve this aim the following objectives are set:
1) to determine the specific features relevant from the perspective of insolvency law that distinguish IMSEs from other forms of business, and therefore need to be addressed when designing effective insolvency frameworks;
2) to analyse the sufficiency of instruments and good practice guides that address the needs of small businesses and are aimed at supporting governments in designing and implementing effective insolvency policies in that regard.

This paper is an effort to contribute to the emerging scientific discussion on the research question of whether an effective insolvency framework should, and if so – how, specifically address the needs of IMSEs in financial distress and enhance their contribution to inclusive growth. The research is based on a reflective stance by relying on secondary literature, using the methods of comparative and systematic data analysis. The sources of data are the doctrine, legal acts, reports, and working documents of various international and regional organisations such as the World Bank, UNCITRAL, OECD, International Monetary Fund (IMF), EU, and others, related to the effectiveness of the insolvency law, the methodology of its evaluation, the heterogeneity of business, and the perspectives of small businesses.

The paper is structured as follows: first, we will discuss the objectives of insolvency laws. Then, we will analyse the specific characteristics of small businesses and check if they provide for a specific treatment when designing effective insolvency frameworks. The final chapter provides insights on the most influential international standards, focusing on an evaluation of the effectiveness of insolvency frameworks (World Bank, UNCITRAL, OECD, IMF, EU), their key design features, relevant indicators, their suitability to respond to the needs of IMSEs, conclusions, and suggestions.

2. The unique challenges faced by IMSEs in situations of financial distress in comparison to medium sized or large firms

Analyses of contemporary theories on the objectives of insolvency law (Finch, 1997; Azmi & Razak, 2013) show that the interests and needs of the debtor should be taken into account. Therefore, one of the key policy choices to be made when designing an insolvency framework relates to how to balance the objectives to provide the debtor protection and creditor recovery against each other (International Monetary Fund [IMF], 1999).

Currently, the literature and policy papers evidence a consensus that to be effective, insolvency frameworks should be accessible to distressed firms and facilitate exit in a predictable and expedient manner. More specifically, they should: i) incentivize the restructuring of viable firms and the liquidation of non-viable ones at low cost in order to maximise the total value of proceeds to be distributed between creditors, shareholders, employees, and other stakeholders; ii) balance the interests of the parties involved to ensure an equitable resolution without discouraging future risk-taking by investors and entrepreneurs; and iii) provide for a timely resolution of insolvency (McGowan & Andrews, 2016).

While the objectives of insolvency regimes are well-established, there is less consensus on their optimal design (OECD, 2018a). Modern insolvency systems typically have been designed with debtors as larger enterprises in mind (Mokal et al., 2018; The World Bank, 2017). In this chapter, we will analyse if the frameworks and standards that have been developed in, and for, medium-sized or large firms are suitable to be applied to small businesses as well. We will consider whether we might add to this list of objectives an additional one: an effective insolvency framework should respond to the specific needs of financially distressed small businesses.

The first difficulty encountered when conducting research related to small businesses is the apparent lack of a consistent or universally accepted definition of the term *small business*. The definitions and concepts used for identifying small businesses vary significantly among countries at the regional (e.g., EU level) and international level. It is observed that, in most countries, it is an accepted practice to make use of quantitative criteria when defining a small business enterprise (Mokal et al., 2018; Okyere, 2017). The examples of quantitative criteria in defining a small business are: the number of employees; the sales volume; the value of assets; and the market share (Ardic, Mylenko, & Saltane, 2011). For example, in the EU a small business is defined as a business with less than 50 employees but also an annual turnover of below €10 million (EU, 2003).

Despite the variations in applying different measurements, there is a common consensus that the category of small business encompasses the following sub-categories: individual entrepreneurs, micro, and small enterprises (IMSEs).

For the purposes of this paper, we will not rely strictly on the quantitative but rather on the qualitative criteria when defining IMSEs – in other words we will check which shared specific characteristics distinguish them from medium sized and large firms and cause unique challenges in situations of financial distress.

The three main unique characteristics of IMSEs most closely linked with the specific challenges they encounter in insolvency can be distinguished as follows:

1) The first specific characteristic of IMSEs is the blurred distinction between the assets and liabilities of the business and those of the owner.

In contrast to medium-sized or larger firms, in the majority of cases IMSEs are unincorporated, meaning that the debts of the business are personal liabilities of the owner. Even in cases were IMSEs may have a limited liability form, the personal and business debts of micro and small enterprises are often intertwined. This is because lenders that make loans to small enterprises often require the owner to personally guarantee the debt and/or allow the lender to take a lien on the owner's house (Ortiz-Molina & Penas, 2007; Berkowitz & White, 2004; Djankov, Hart, McLiesh, & Shleifer, 2008). These guarantees and liens abolish the legal distinction between the corporation and its owner for the purposes of the particular loan, and as it is rightly pointed out act as an equivalent to "contracting out" the limited liability protection (Cumming, 2012).

As recognized in the literature and EU reports (Bergthaler et al., 2015; European Commission, 2013), the complex, lengthy, and rigid procedures, required expertise, and high costs of insolvency often fail to adequately meet the needs of micro and small business which are also owned and operated by families who have pledged their personal assets for business credit. In other words, the limited liability of the firm no longer applies to this particular credit (Cirmizi et al., 2010). Another related issue is that there may be no clearly established ownership of key commercial assets (such as tools or other essential equipment). It is not unusual for owners to use personal assets for business purposes and business assets for personal or family needs (UNCITRAL, 2020). The closely linked consequence of these characteristics is that in case of default bankruptcy, the entrepreneur will often face personal as well as corporate insolvency (Cirmizi et al., 2010; Cumming, 2012), and if there is no sound personal insolvency regime then the business debts stay with the debtor for an undefined future period. This is stressed in the literature, showing that while the personal guarantee of a firm's owner might encourage a level of financial discipline, in countries without a personal bankruptcy framework a single business failure could doom an owner to a lifetime of outstanding debt (Uttamchandani & Menezes, 2010) and effectively prevent them from re-entering the market as a seasoned entrepreneur (Armour & Cumming, 2005).

What challenge does this cause in an insolvency situation? Existing standard business insolvency regimes usually restrict insolvency proceedings to the business debts of a distinct business entity, and do not comprehensively address the intermingled business and personal debts usually involved in the insolvency of IMSEs. As pointed out by the international experts, individual entrepreneurs may be treated as individual defaulters and be subject to personal insolvency frameworks where such frameworks exist. The latter may not provide temporary protection from creditors, nor allow for debt restructuring procedures and discharge. Where discharge is available for individual entrepreneurs, a long waiting period before discharge may apply, leaving full personal liability for many years after the liquidation of the business. Heavy penalties, including limitations on freedom of movement and other personal restrictions, may also apply (UNCITRAL, 2020). The results of empirical research show that the lack of a fresh start with restrictions on the rights of debtors and a lack of protection of their personal assets are associated with both a lower likelihood of being engaged in a start-up and a lower likelihood of high aspirations towards entrepreneurship in particular (Estrin, Mickiewicz, & Rebmann, 2017).

So, this question of blurring between assets and liability is the main issue to be addressed by insolvency framework aiming to include the perspective of the small business and construct a regime that would effectively handle the situation of the distressed small business.

2) The second specific characteristic of IMSEs is the overlap of ownership, control, and management functions.

The separation between the ownership and the management of IMSEs is blurred in contrast with larger firms with professional management bodies. This feature affects access to insolvency proceedings. Many IMSEs have a centralised management model in which ownership, control, and management overlap (usually within a family) (UNCITRAL, 2020). This causes challenges in times of financial distress because small entrepreneurs fear the

risk of losing control over their business. Empirical research shows that limitations on the entrepreneurs' control over the firm in insolvency proceedings, such as an automatic stay on secured assets and the mandatory removal of management, are associated with a lower likelihood of individuals entering high-aspiration entrepreneurship, which suggests that such provisions should be avoided (Estrin et al., 2016). An owner may also hide a financial crisis out of fear of damaging a good commercial name, relationships with employees, suppliers, and the market, or disrupting existing lines of credit (UNCITRAL, 2020). IMSEs are most often managed by the owner and not a professional manager in contrast to larger enterprises, and may not have the financial information required for an application to commence insolvency proceedings. Because of these features, IMSEs encounter specific difficulties in financial distress, which their bigger counterparties would not usually face.

3) The third specific characteristic of IMSEs is the lack of assets in situations of financial difficulty, and their related challenges due to limited access to insolvency in general, and to restructuring specifically.

Given that most IMSEs' lending is secured by real estate or a personal guarantee, banks have a strong incentive in the event of a loan default to enforce the guarantee or initiate foreclosure to realize the security and collect proceeds (Bergthaler et al., 2015). Unencumbered assets of IMSEs are usually of little to no value for distribution to unsecured creditors. As a result, those creditors may not be willing to invest the time and resources for the resolution of IMSEs' financial difficulties, because the costs of their participation in those efforts may outweigh the returns. Hold-outs by secured creditors and the disengagement of unsecured creditors jeopardise the chances of successful debt restructuring negotiations and the reorganization of viable IMSEs, leaving liquidation as the only option (The World Bank, 2017). Additionally, due to the lack of (sufficient) funds in the insolvency estate, IMSEs may be ineligible to apply for insolvency in some jurisdictions, or insolvency proceedings may be terminated after their commencement in other jurisdictions (UNCITRAL, 2020). Burdened by unresolved financial difficulties and old debt, IMSEs may be discouraged from taking new risks, become trapped in a cycle of debt, or be driven to the informal sector of the economy (Mokal et al., 2018).

In can be concluded that the traditional assumption among insolvency policy makers for a long time has been that small businesses usually act as larger businesses, only on a smaller scale. We have showed that the size and nature of small businesses distinguishes them from their larger counterparts, creates special challenges in times of financial distress, and requires, inter alia, some very different approaches to insolvency policy.

In order to be effective, insolvency frameworks should address the specific needs of financially distressed small business throughout the entire insolvency framework, focusing on specific points where: access can be improved and made less costly; the question of intermingled assets, liability, and a fresh start will be dealt with; and where IMSEs can be encouraged to seek early advice on how to address their financial difficulties.

3. Do existing international standards on the effectiveness of insolvency frameworks take into account the specifics of IMSE insolvency?

3.1. The international standards on effectiveness of insolvency frameworks – general considerations

Determining the effectiveness of an insolvency system requires the evaluation of both quantitative and qualitative elements. As insolvency systems seek to achieve complex objectives, the characteristics and the volume of data required to assess their effectiveness can be significant. In addition, there are features of the system that need to be assessed qualitatively. For this reason, the analysis of insolvency systems relies on the interplay of standards, indicators, and data (Garrido et al., 2019).

In this chapter, we will verify whether the existent international initiatives and instruments that provide guidelines for countries wishing to assess the effectiveness of their current insolvency frameworks, or wishing to steer their reforms towards designing well-functioning insolvency regimes, take into account the specific needs of IMSEs.

For many years, scholars and experts have sought to describe the best framework for insolvency. While there is no universal model or blueprint for optimal insolvency systems worldwide, there are several important standards elaborated on at the international level that reflect best practices endorsed by the international community and underlie what constitutes a sound insolvency regime. These standards represent the consensus of international bodies on the core features of legal or regulatory systems. The two primary internationally recognized benchmarks jointly acknowledged as international standards for insolvency regimes are The World Bank's "Principles for Effective Insolvency and Creditor Regimes" (The World Bank, 2016) and the UNCITRAL's "Legislative Guide on Insolvency Law" (UNCITRAL 2004–2013; Consolo, Malfa, & Pierluigi, 2018), based on which the World Bank has built the Resolving Insolvency indicator in its most famous product: Ease of Doing Business rankings. The UNCITRAL itself does not provide for specific evaluation criteria and indicators, but the World Bank relies on its research when creating and refining the system of Resolving Insolvency indicators.

Additionally, some other major international players have also provided policy recommendations towards reforms that target insolvency frameworks: the IMF report of 1999 discussed the major policy choices to be addressed by countries when designing insolvency systems (IMF, 1999); OECD compiled a new database on insolvency framework reforms with the 13 OECD indicators of insolvency frameworks (OECD, 2018b); and the EU adopted the new Directive on restructuring and insolvency 2019/1023, which aims at achieving common standards on early restructuring across EU Member States (Directive 2019/1023, 2019).

Next, we will more closely review whether these initiatives take into account the specific characteristics of IMSEs when constructing their guidelines on the evaluation of the effectiveness of insolvency framework.

3.2. The World Bank Principles and Resolving Insolvency indicators system

One of the main data sources on insolvency frameworks is the World Bank's Ease of Doing Business index with its specific Resolving Insolvency indicator that not only provides a snapshot of a country's relative position, but also monitors its evolution from one year to the next and allows for an evaluation of the level of achievement.

Even though the Ease of Doing Business Index is formally a non-coercive reporting exercise, and may not always accurately reflect appropriate regulation, its existence has influenced governments around the world to change their economic and regulatory policies. By benchmarking, and especially by ranking, the World Bank intentionally exerts competitive social pressure on states. Plausible observational evidence demonstrates an average global correlation between publicizing the rankings, bureaucratic adaptations responding to the rankings, and the acceleration of actual policy reforms. One investor survey experiment clearly showed that international investors may also be influenced by a state's Ease of Doing Business rankings (Doshi, Kelly, & Simmons, 2019). The Doing Business index is often cited in the agendas of legislative powers in justifying insolvency reforms with the aim of improving the country's position in the World Bank doing business ranking (e.g., India, Lithuania, Portugal, Yemen, Russia, and many others as seen from the World Bank Group reports). This ranking focuses on regulatory issues and their importance for growth. The close relationship between improving the legislative framework and growth underpins an important set of developments that has been repeated since the beginning of this century. The seminal work by Djankov, McLiesh, and Ramalho (2006) confirms this association (Estevao, Lopes, Panela, & Soares, 2020).

The Doing Business Index, launched in 2002, aspires to provide evidence-based objective measures of regulations applied to small and medium enterprises through their life cycle. As the Doing Business report explains in its own

description: "By gathering and analysing comprehensive quantitative data to compare business regulation environments across economies and over time, Doing Business encourages countries to compete towards more efficient regulation; offers measurable benchmarks for reform" (Žylius & Basheka, 2014; website of Doing Business: https://www.doingbusiness.org/en/doingbusiness). The Doing Business Resolving Insolvency indicators aim at measuring the efficiency and quality of insolvency frameworks around the world. These indicators are not static, and the evaluation system is evolving with each evaluation period.

At the beginning the Resolving Insolvency indicators focused only on outcome-based indicators, capturing the efficiency of insolvency proceedings through the set of recovery rate indicators: the time, cost, and outcome of insolvency proceedings, and how much creditors would recover at the end (i.e., the recovery rate). In 2015, Doing Business introduced an important change in the methodology of indicators for Resolving Insolvency. Besides measuring the recovery rate, it now also tests whether each economy has adopted internationally recognized good practices in the area of insolvency. A new indicator, the strength of insolvency framework index, measures good practices in accordance with the principles developed by the World Bank and the UNCITRAL – the World Bank's "Principles for Effective Insolvency and Creditor/Debtor Regimes" and UNCITRAL's "Legislative Guide on Insolvency Law".

The purpose of the change in the methodology was to provide a more complete and balanced view of the insolvency framework in each economy by addressing both the quality of the law and the efficiency of its implementation – in other words, to focus on the effectiveness instead of just efficiency. Additionally, while the previous methodology focused mainly on secured creditors, the new index widens the reach of the set of Resolving Insolvency indicators to debtors and unsecured creditors (The World Bank, 2014).

So currently, country rankings are based on performance with respect to two equally weighted sub-indicators (50:50):
1) Outcome-based indicators: the recovery rate, based on the time, cost and outcome of insolvency proceedings based on a stylised case study;
2) Strength of Insolvency Framework Index (introduced in 2015), based on four other indices: commencement of proceedings index; management of debtor's assets index; reorganization proceedings index; and creditor participation index.

In order to answer if the needs of IMSEs are being taken into account when evaluating the effectiveness of insolvency regimes applying the Doing business methodology, we need to consider the basis for both of these sub-indicators.

Regarding the methodology of the outcome-based indicators, it is necessary to mention that the case study is used to derive the outcome based (de facto) indicators. This has both advantages and disadvantages. On the positive side, it is a direct attempt to gauge the average time and cost of insolvency proceedings given that survey respondents typically find it difficult to give an exact answer to a general questionnaire without details on the complexity of the individual case (The World Bank, 2014).

From the other side, these answers depend on the situation at hand: general assumptions used as a basis for this methodology are generated based on answers related to one specific situation and one concrete type of subject. So, what are these general assumptions, and do they cover the situation of IMSEs? There are 2 groups of assumptions in the case: 1) assumptions about the business; and 2) assumptions about the case. From the assumptions about the business we can see that the case is based on the example of a firm (a hotel) with more than 200 employees, 50 suppliers, and solid assets (real estate), and has a professional general manager and a market value of operating as a going concern, of 100 times income per capita or US$200,000, whichever is greater (The World Bank, 2014). So, if compared with the specific characteristics of IMSEs as described above, these business assumptions are based on an example which clearly does not reflect the situation of most IMSEs.

Firstly, it only covers corporate insolvency and therefore the individual entrepreneurs are not covered by it at all. Second, all of these characteristics of the firm are way above the threshold of the micro and small business, and do not reflect their specific characteristics which require different solutions. Namely, IMSEs in most cases are small family businesses with intermingled personal and business assets led by their owner and not a professional manager, while the case example is clearly a medium-sized professionally led enterprise.

Accordingly, the results acquired by using the methodology related to the outcome-based indicators of the World Bank Doing business Resolving Insolvency indicator do not cover the situation of IMSEs, and therefore cannot per se be transferred and applied to the situation of IMSEs, nor to the situation of individual entrepreneurs who are not covered at all, nor to the situations of micro or small businesses.

Regarding the methodology of the Strength of Insolvency Framework Index it needs to be stressed that, after going through all four indices (commencement of proceedings index, management of debtor's assets index, reorganization proceedings index and creditor participation index) and their components, the conclusion could be made that they do not distinguish between various types of debtor's and concern only the general insolvency questions relevant to larger firms (having access to the proceedings, active participation of creditors, etc.). They do not take into account the specific questions relevant to IMSEs, especially the so-called blurred line between the corporate vs. non-corporate distinction of assets and liabilities (see Berkowitz & White, 2004; Cumming, 2012).

We can conclude that in the current version of the World Bank Resolving Insolvency indicator system based on international good practice there are no guidelines on how to construct an effective insolvency regime that would cover the specific needs of IMSEs.

3.3. The OECD indicators for evaluating insolvency regimes

Another influential international organisation that works on establishing evidence-based international standards and finding solutions to a range of social, economic, and environmental challenges is the OECD. For many years, the OECD has developed a variety of indicators that measure the regulatory barriers for starting businesses and competition, allowing for the comparability of results across countries (Koske, Wanner, Bitetti, & Barbiero, 2015). However, a similar system of indicators tackling the regulatory barriers to the last cycle of a business's life – firm exit, or in other words insolvency – has been absent.

To fill a gap and provide complementary insights to those of the World Bank indicators system, particularly in regard to the identification of detailed policy-level reform needs, in 2018 the OECD designed and constructed a new set of cross-country indicators of insolvency regimes (McGowan & Andrews, 2018) via its Going for Growth framework. The choice of questions and the quantitative coding of the potential responses to each question were based on the main conclusions of the theoretical and empirical literature on the links between insolvency regimes and economic growth. The report, which formed the basis for the system of indicators, makes reference to the World Bank system, stating that the available cross-country indicators of insolvency regimes (e.g., World Bank Doing Business) have a number of drawbacks which make it difficult to identify the contribution of insolvency regimes to productivity performance (McGowan & Andrews, 2016). To fill the gaps in the existing indicators, the OECD presented new cross-country policy indicators on the effectiveness of insolvency regimes.

So does this OECD framework take into account the specific characteristic and needs of distressed IMSEs?

The OECD distinguishes 4 groups of factors to be considered when evaluating the effectiveness of insolvency regimes, and the indicators, in contrast to the World Bank Resolving Insolvency system, cover not only corporate but also personal insolvency.

Specifically, the four main insolvency indicators (divided into 13 sub-indicators) are:

- A. Treatment of failed entrepreneurs: in other words, the availability of a fresh start for failed entrepreneurs with respect to two features: time to discharge; and exemptions of their personal assets from insolvency proceedings;
- B. Prevention and streamlining: three mechanisms that aid prevention and streamlining: early warning mechanisms, pre-insolvency regimes, and special insolvency procedures for SMEs;
- C. Tools related to actual restructuring: five features: the ability of creditors to initiate restructuring, the availability and length of stay on assets, the priority order of claimants (such as government or employees), the treatment ("cram-down") of dissenting creditors, and the incumbent management;
- D. other factors, such as: the degree of court involvement, provisions distinguishing between honest and fraudulent bankruptcies, and the rights of employees (OECD, 2018b).

As we see, the OECD indicators already tackle many questions relevant to IMSEs.

The first key dimension is the treatment of failed entrepreneurs, which is of paramount importance for IMSEs.

The most up-to-date research on the association between the effectiveness of insolvency regulations and entrepreneurship (Fu, Wennbertg, & Falkenhall, 2020), along with cross-country evidence compiled in the OECD Going for Growth interim report (2018), suggests that in particular a lengthy time to discharge can discourage entrepreneurship. The availability of a "fresh start" has been found to foster the growth of productivity via higher incentives for entrepreneurship and experimentation by: i) increasing firm entry (Cumming, 2012); ii) providing failed entrepreneurs with a second chance to apply their experience and lessons learnt to ensure the growth of their new businesses (Burchell & Hughes, 2006); and iii) attracting better quality entrepreneurs – i.e., individuals with higher observed human capital (Eberhart, Eesley, & Eisenhardt, 2016).

The OECD indicator assumes that a lengthier time to discharge is detrimental to the growth of productivity, and hence is given a higher ("worse") value. Threshold values of one and three years are adopted for scoring, with the worst score given to a time to discharge above three years. This is also in line with the EU position of limiting discharge periods in the EU to a maximum of three years for honest entrepreneurs.

The second important position linked with IMSEs can be found under the sub-indicators of the indicator "Prevention and streamlining features", namely "Special insolvency procedures for SMEs". On the one hand, this calls for the specific forms of business to be taken into account, which is good for IMSEs, but conversely this sub-indicator does not distinguish between IMSEs and medium-sized enterprises that, as we previously clarified, are very different from small businesses. The indicator gives a score only for the existence of special insolvency procedures for SMEs, and does not give any insights into how insolvency framework should be designed in order to take into account the specific characteristics and needs of IMSEs.

Under the third indicator of "Restructuring tools", the OECD summarises the general principles related to sound restructuring regimes (such as the possibility for creditors to initiate restructuring and the possibility of management not to be dismissed during restructuring, which is important for IMSEs as well as for all other forms of business) and does not indicate any specifics related to IMSEs. For example, often in the literature the question of the impeded access of IMSEs to these procedures in general is raised, whether due to the lack of resources to finance such proceedings, to engage an insolvency professional etc. (Mokal et al., 2018).

The fourth indicator "Other design features" again shows some relevance to distressed IMSEs, especially its sub-indicator related to the degree of court involvement. Court involvement costs and this financial burden could

impede access of IMSEs to insolvency procedures, due to a lack of assets to cover the associated fixed costs (Bergthaler et al., 2015).

In conclusion, the OECD indicators partially take into account the specifics of the IMSEs, but provide no coherent system for the elements to be included into insolvency framework in order to have an effective insolvency regime for IMSEs. Still, this is currently the most important available tool, giving at least some initial guidance to countries on how to construct effective insolvency framework that can respond to the specific needs of IMSEs. These indicators also allow for cross-country comparisons of certain features of the design of insolvency regimes regarding how they treat financially distressed IMSEs, and give future insights for policy reforms in this area.

3.3. Other standards and initiatives

As already mentioned, the IMF also targeted the issue of effective insolvency framework with its "Guidelines for Orderly and Effective Insolvency Procedures" (IMF, 1999), which was primarily concerned with the application of insolvency laws to enterprises rather than individuals. This report did not distinguish between large and small enterprises and, before formulating general guidelines, clearly stated that a number of the issues discussed may only be of particular relevance to a relatively large enterprise that has a number of creditors with divergent interests. Due to the limited scope of this report, we can conclude that there are no guidelines in the IMF report on how to construct an effective insolvency regime that would take into account the specific characteristics and needs of IMSEs.

We can find some general ideas on the importance of IMSEs in its later report from 2015—"Tackling Small and Medium Sized Enterprise Problem Loans in Europe" (Bergthaler et al., 2015)—which presumed that, based on cross-country experience with distressed small and medium sized enterprises (SMEs), a comprehensive strategy including insolvency reform targeted at SMEs is needed. Insolvency regimes should close the gap with international best practice for rapid pre-pack approvals, "fresh start"/debt discharge, and debtor-in-possession financing. As we have outlined, these proposed solutions address the whole business sector in general but are not specifically tailored for IMSEs.

At the EU level, a number of initiatives were developed targeting the regulatory framework for small businesses, including the Small Business Act 2008 which outlines a set of recommendations based on cross-country experience and good practice, but does not specifically focus on insolvency issues (European Commission, 2008). The most important achievement at the EU level is the new Directive 2019/1023 of the European Parliament and of the Council of 20 June 2019 on preventive restructuring frameworks, on the discharge of debt and disqualifications, and on measures to increase the efficiency of procedures concerning restructuring, insolvency, and discharge of debt, and amending Directive (EU) 2017/1132 (Directive on restructuring and insolvency), which aims at enhancing rescue culture in the EU and encouraging entrepreneurship by avoiding the stigmatization of business failure and providing the opportunity for a second chance. However, its approach was rightly criticized in the literature for not devoting enough attention to micro, small, and medium sized enterprises (and following, not taking into account the specifics of IMSEs), and clearly designing most of its provisions for larger corporations (Madaus, 2017; Mokal et al., 2018). Additionally, the EU constructed the information tool "EU Justice Scoreboard", which aims at helping the EU to achieve more effective justice and provides comparable data on the independence, quality, and efficiency of national justice systems. This scoreboard, however, does not focus specifically on insolvency problems and, as is almost self-explanatory, does not provide EU Member States with concrete standards and indicators for the evaluation of the effectiveness of insolvency frameworks in relation to the specifics of IMSEs.

In conclusion, whilst EU initiatives may have some important implications for IMSEs they are not tailored specifically to IMSEs, and do not provide countries with the standards or indicators of best practice that might enable them to guide reforms aimed at improving the effectiveness of insolvency framework for IMSEs.

The overall conclusion based on the analysis of the existing international initiatives and instruments is that currently there is no comprehensive international guidance which could stimulate and steer countries to improve the effectiveness of their insolvency frameworks in a way that would respond to the needs of the majority of businesses – IMSEs.

There is a need to create a more all-encompassing framework for the evaluation of the effectiveness of regimes of insolvency law applicable specifically to IMSEs. The international community is becoming aware of this, and has already initiated some important steps in order to tackle this problem. The most important work currently in progress is the UNCITRAL work on a "Draft Text to Simplify Insolvency Regime Proceedings" (UNCITRAL, 2020), which specifically targets the needs of financially distressed small business. From the agendas of the World Bank, it can also be seen that a new objective for its Working Groups to prepare a joint standard setter together with UNCITRAL in the area of insolvency for small businesses has been introduced (The World Bank, 2017). If it succeeds with outlining a specific set of indicators related to small businesses, then this would be a major reform stimulus for many countries aiming at improving the effectiveness of insolvency frameworks for IMSEe.

5. Conclusions

This research argues that one of the key objectives of an effective insolvency framework should be to provide solutions on specific issues arising from the insolvencies of IMSEs, such as the blurred distinction between the assets and liabilities of the business and those of the owner, the overlap of ownership, control, and management functions, concerns over stigmatization, resource poverty, and the disengagement of creditors.

The analysis of the existing international guidelines that deal with the evaluation of the effectiveness of insolvency frameworks shows that current good practice guidelines and indicators either do not cover issues that are important for IMSEs at all or are tackling only some of them in a more general manner. Specifically, countries aiming at improving their World Bank Doing Business ranking in relation to the Resolving Insolvency indicator should be aware of its current limitations regarding the specific needs of IMSEs in times of financial distress. The OECD indicators of insolvency regimes are currently the most suitable tool for providing some initial guidance on how to construct effective an insolvency framework that adequately addresses at least some of the specific needs of IMSEs.

Despite these positive steps in initiating the reforms aimed at targeting the needs of financially distressed IMSEs, there is a need for a more comprehensive approach toward IMSEs in financial distress which would stimulate and steer countries to improve the effectiveness of their insolvency frameworks in a way which would respond to the needs of the majority of businesses: IMSEs, and to encourage entrepreneurship as a consequence.

References

Ardic, O. P., Mylenko, N., & Saltane, V. (2011). Small and medium enterprises: A cross-country analysis with a new data set. *World Bank Policy Research Working Paper No. 5538*. https://doi.org/10.1596/1813-9450-5538

Armour, J., & Cumming, D. J. (2005). Bankruptcy law and entrepreneurship. *ESRC Centre for Business Research Working Paper No. 300.* Retrieved from https://www.cbr.cam.ac.uk/fileadmin/user_upload/centre-for-business-research/downloads/working-papers/wp300.pdf

Azmi, R., & Abd Razak, A. (2013). Theories, objectives and principles of corporate insolvency law: a comparative study between Malaysia and UK. *Proceedings of the 3rd International Conference on Management, 10–11 June 2013, Hydro Hotel, Penang, Malaysia* (pp. 667–679). *paper.* Retrieved from http://repo.uum.edu.my/12310/

Bergthaler, W., Kang, K., Liu, Y., & Monaghan, D. (2015). *Tackling small and medium enterprise problem loans in Europe*. International Monetary Fund. Retrieved from https://www.imf.org/external/pubs/ft/sdn/2015/sdn1504.pdf

Berkowitz, J., & White, M. (2004). Bankruptcy and small firms' access to credit. *RAND Journal of Economics*, *35*(1), 69–84. Retrieved from https://econweb.ucsd.edu/~miwhite/rje.spring04.berkowitz.pdf

Burchell, B., & A. Hughes (2006). The stigma of failure: An international comparison of failure tolerance and second chancing. *University of Cambridge Centre for Business Research Working Paper No. 334*. Retrieved from https://www.cbr.cam.ac.uk/fileadmin/user_upload/centre-for-business-research/downloads/working-papers/wp334.pdf

Consolo, A., Malfa, F., & Pierluigi, B. (2018). Insolvency frameworks and private debt: an empirical investigation. *ECB Working Paper No. 2189.* Retrieved from SSRN: https://ssrn.com/abstract=3275147

Cumming, D. (2012). Measuring the effect of bankruptcy laws on entrepreneurship across countries. *Journal of Entrepreneurial Finance*, *16*(1), Article 4. Retrieved from https://digitalcommons.pepperdine.edu/cgi/viewcontent.cgi?article=1007&context=jef

Cirmizi, E., Klapper, L., & Uttamchandani, M. (2010). The challenges of bankruptcy reform. *World Bank Policy Research Working Paper No. 5448.* Retrieved from https://ssrn.com/abstract=1694337

Directive 2019/1023 of the European Parliament and of the Council of 20 June 2019 on preventive restructuring frameworks, on discharge of debt and disqualifications, and on measures to increase the efficiency of procedures concerning restructuring, insolvency and discharge of debt, and amending Directive (EU) 2017/1132 (Directive on restructuring and insolvency). *OJ L 172*, 18–55.

Djankov, S., Hart, O., McLiesh, C., & Shleifer, A. (2008). Debt enforcement around the world. *Journal of Political Economy*, *116*(6), 1105–1149. Retrieved from https://www.doingbusiness.org/content/dam/doingBusiness/media/Methodology/Supporting-Papers/DB-Methodology-Debt-Enforcement-around-the-World.pdf

Djankov, S., McLiesh, C., & Ramalho, R. M. (2006). Regulation and growth. *Economic Letters*, *92*(3), 395–401. https://doi.org/10.1016/j.econlet.2006.03.021

Doshi, R., Kelly, J. G., & Simmons, B. A. (2019). The power of ranking: The Ease of Doing Business Indicator and Global Regulatory Behavior. *International Organization*, *73*(3), 611–643. https://doi.org/10.1017/S0020818319000158

Eberhart, R., Eesley, C., & Eisenhardt, K. (2016). Failure is an option: Failure barriers and new firm performance. *Rock Centre for Corporate Governance at Stanford University Working Paper No. 111*. Retrieved from http://ssrn.com/abstract=1982819

Estevao, J., Lopes, J. D., Panela, D., & Soares, J. M. (2020). The Doing Business ranking and the GDP. A qualitative study. *Journal of Business Research*, *115*, 435–442. https://doi.org/10.1016/j.jbusres.2019.11.067

Estrin, S., Mickiewicz, T., & Rebmann, A. (2017). Prospect theory and the effects of bankruptcy laws on entrepreneurial aspirations. *Small Business Economics*, *48*, 977–997. https://doi.org/10.1007/s11187-016-9810-1

European Commission. (2000). *European Charter for Small Enterprises*. Retrieved from https://ec.europa.eu/growth/content/european-charter-small-enterprises-0_en

European Commission (2003). Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises. C(2003)1422). *OJ L 124, 36–41.*

European Commission. (2008). *Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions - "Think Small First" - A "Small Business Act" for Europe {SEC(2008) 2101} {SEC(2008) 2102} COM/2008/0394 final.* Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52008DC0394

European Commission. (2012). *Communication from the Commission to the European Parliament, the Council, the European economic and social committee and the Committee of the regions. Entrepreneurship 2020 Action Plan. Reigniting the entrepreneurial spirit in Europe. COM/2012/0795 final*. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52012DC0795

European Commission. (2013). *Finance for growth. Report of the High Level Expert Group on SME and infrastructure financing*. Retrieved from http://www.cica.net/wp-content/uploads/2015/11/hleg_report_2013.pdf

European Commission. (2019). *Communication from the Commission to the European Parliament, the Council, the European central bank, the European economic and social committee, the Committee of the regions and the European investment bank. Annual sustainable growth strategy 2020. COM/2019/650 final.* Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1578392227719&uri=CELEX%3A52019DC0650

European Commission. (2020). *Communication from the Commission to the European Parliament, the Council, the European economic and social committee and the Committee of the regions. An SME Strategy for a sustainable and digital Europe COM/2020/103 final.* Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2020%3A103%3AFIN

EU Directorate-General for Communication. (2015). *Flash Eurobarometer 354: Entrepreneurship in the EU and beyond*. Retrieved from EU Open Data Portal http://data.europa.eu/88u/dataset/S1024_354

Finch, V. (1997). The measures of insolvency law. *Oxford Journal of Legal Studies*, *17*(2), 227–251. https://doi.org/10.1093/ojls/17.2.227

Fu, K., Wennbertg, K., & Falkenhall, B. (2020). Productive entrepreneurship and the effectiveness of insolvency legislation: a cross-country study. *Small Business Economics*, *54***,** 383–404. https://doi.org/10.1007/s11187-018-0040-6

Garrido, J., Bergthaler, W., DeLong, C., Johnson, J., Rasekh, A., Rosha, A., & Stetsenko N. (2019). The use of data in assessing and designing insolvency systems. *IMF Working Paper No. 19/27*. Retrieved from https://www.imf.org/en/Publications/WP/Issues/2019/02/04/The-Use-of-Data-in-Assessing-and-Designing-Insolvency-Systems-46549

International Monetary Fund. (1999). *Orderly & Effective Insolvency Procedures. Key Issues.* Retrieved from https://www.imf.org/external/pubs/ft/orderly/index.htm

Klapper, L., Laeven, L., & Rajan, R. (2006). Entry regulation as a barrier to entrepreneurship. *Journal of Financial Economics*, *82*(3), 591–629. https://doi.org/10.1016/j.jfineco.2005.09.006

Koske, I., Wanner, I., Bitetti, R., & Barbiero, O. (2015). The 2013 update of the OECD's database on product market regulation: Policy insights for OECD and non-OECD countries. *OECD Economics Department Working Papers No. 1200*. https://doi.org/10.1787/5js3f5d3n2vl-en

Madaus, S. (2017). *The Impact on SMEs of the Proposal of Preventive Restructuring, Second Chance and Improvement Measures.* European Parliament, Directorate General for Internal Policies, Policy Department for Citizens' Rights and Constitutional Affairs. Retrieved from https://www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL_IDA(2017)583151

McGowan, M. A., & Andrews, D. (2016). Insolvency regimes and productivity growth. *OECD Economics Department Working Papers No. 1309*. https://doi.org/10.1787/5jlv2jqhxgq6-en

McGowan, M. A., & Andrews, D. (2018*).* Design of insolvency regimes across countries. *OECD Economics Department Working Papers No. 1504.* Retrieved from http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ECO/WKP(2018)52&docLanguage=En

Mokal, R., Davis, R., Mazzoni, A., Mevorach, I., Romaine, B., Sarra, J., Tirado, I., & Madaus, S. (2018). *Micro, small and medium enterprise insolvency. A modular approach.* Oxford: Oxford University Press. https://doi.org/10.1093/oso/9780198799931.001.0001

Nickell, J. S (1996). Competition and corporate performance. *Journal of Political Economy*, *104*(4), 724–746. https://doi.org/10.1086/262040

OECD (2018a). *Strengthening SMEs and entrepreneurship for productivity and inclusive growth: Key issues paper.* Prepared for OECD SME Ministerial Conference, 22–23 February 2018, Mexico City. Retrieved from https://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupMeetingDoc&docid=12471

OECD (2018b). Policies for productivity: the design of insolvency regimes across countries. In OECD, *Economic policy reforms 2018: Going for growth interim report* (pp. 87-109). Paris: OECD Publishing. Retrieved from http://www.oecd.org/economy/growth/policies-for-productivity-the-design-of-insolvency-regimes-across-countries-2018-going-for-growth.pdf

Okyere, F. (2017). Relationship between entrepreneurship and small, medium and micro enterprises (SMMEs): A literature review. *The International Journal of Business & Management*, *5*(9), 159–163. Retrieved from http://internationaljournalcorner.com/index.php/theijbm/article/view/125039

Ortiz-Molina, H., & Penas, M.F. (2007). Lending to small businesses: the role of loan maturity in addressing information problems. *Small Business Economics, 30***,** 361–383. https://doi.org/10.1007/s11187-007-9053-2

The World Bank. (2014). Resolving Insolvency: Measuring the strength of insolvency laws. In *Doing Business 2015: Going Beyond Efficiency* (pp. 96–101). https://doi.org/10.1596/978-1-4648-0351-2_Resolving_Insolvency

The World Bank. (2016). *Principles and guidelines for effective insolvency and creditor rights systems.* Washington, D.C.: International Bank for Reconstruction and Development; The World Bank Group. Retrieved from http://pubdocs.worldbank.org/en/919511468425523509/ICR-Principles-Insolvency-Creditor-Debtor-Regimes-2016.pdf

The World Bank (2017). *Report on the treatment of MSME insolvency (English).* Washington, D.C.: World Bank Group. Retrieved from http://documents.worldbank.org/curated/en/973331494264489956/Report-on-the-treatment-of-MSME-insolvency

UNCITRAL. (2004–2013). *Legislative Guide on Insolvency Law* (Parts one and two, 25 June 2004; part three, 1 July 2010; part four, 18 July 2013). Retrieved from https://uncitral.un.org/en/texts/insolvency/legislativeguides/insolvency_law

UNCITRAL. (2020). Draft text on a simplified insolvency regime. Working Group V (Insolvency Law). Fifty-seventh session New York, 11–14 May 2020. Retrieved from https://undocs.org/en/A/CN.9/WG.V/WP.170

United Nations. (2017). *Promoting entrepreneurship for sustainable development: a selection of business cases from the EMPREC network.* Retrieved from https://unctad.org/en/PublicationsLibrary/diaeed2017d6_en.pdf

Uttamchandani, M., & Menezes, A. (2010). Freedom to fail: Why small business insolvency regimes are critical for emerging markets. *International Corporate Rescue*, *7*(4). Retrieved from http://www.chasecambria.com/site/journal/article.php?id=488

Žylius, R, & Basheka, B. C. (2014). *Insights on the relevance of World Bank Doing Business reports and the recommendations for improvement.* Norway Registers Development AS; Uganda Technology and Management University. Retrieved from https://www.nrd.no/file/repository/resources/insights_on_doing_business_nrd_utamu.pdf

Salvija MULEVIČIENĖ holds a PhD in law and is currently an associate professor at the Institute of Private Law at the Law School of Mykolas Romeris University, Lithuania. She is also the head of the Justice Research Laboratory at Mykolas Romeris University. Her research interests include European and international insolvency law, comparative law, effectiveness and evaluation of justice systems.
ORCID ID: https://orcid.org/0000-0002-8426-3320

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

ATTITUDES TOWARDS ARTIFICIAL INTELLIGENCE IN THE AREA OF PERSONAL FINANCIAL PLANNING: A CASE STUDY OF SELECTED COUNTRIES [*]

Krzysztof Waliszewski [1], Anna Warchlewska [2]

[1,2] *Poznań University of Economic and Business, al. Niepodległości 10, 61-875 Poznań, Poland*

E-mails: [1] krzysztof.waliszewski@ue.poznan.pl; [2] anna.warchlewska@ue.poznan.pl

Abstract. The financial sector's focus on simplifying decision-making processes, maximally shortening procedures via cooperation with the fintech industry, robotisation and the use of artificial intelligence are a response to market needs and becoming an important element of how financial service groups compete on the market. The theory of consumer behaviour assumes that consumers have needs that they will hierarchise, and that they will make choices to maximise their own satisfaction. The purpose of the article is to diagnose the sociological and economic determinants underlying consumer satisfaction in terms of planning personal finances using modern technologies. Comparisons of international data were conducted via quantitative analysis of robo-advice using Mann-Whitney U tests, the Chi-square test and Spearman's rho correlation. The survey results show that the majority of socioeconomic characteristics of households are statistically significant when considering satisfaction with robo-advisory financial services and spending analysis, as well as with artificial intelligence suggesting improvements. This study is a contribution to the literature on consumer behaviour in the modern world.

1. Introduction

The effectiveness of using artificial intelligence (Belanche et al. 2018) in various aspects of the economy has been a topic of discussion for many years now. The speed with which users implement and adapt new technological solutions depends on the level of sophistication offered by financial services in a given country. Each financial institution struggles with data overload and the problem of processing and selecting the most relevant. Thanks to technology, robotisation and artificial intelligence, it becomes possible to personalise customer service and switch to remote service channels.

The application of modern financial solutions not only serves to minimise the costs associated with employment, but also to target action on the complex problems faced by customers. Robotics and artificial intelligence (Xie, 2019) both significantly influence the financial industry, as the technology used there is a key element in the strategy of banks and emerging financial entities (Baker & Dellaert 2017; Jung et al. 2018). Replacing traditional consultancy services with innovations, especially at the beginning, is not met with much enthusiasm, mainly due to the novelty factor, competition, fear and lack of knowledge (Belanche at al. 2018).

The global landscape of innovation is undergoing comprehensive transformation due to the growing importance of intangible investment. The fintech concept (Schueffel 2016; Gai et al. 2018; Das & Ali 2020) currently transcends electronic banking and consumer digitisation services and focuses on the development and implementation of innovative financial instruments to meet the financial requirements of the end-users. Digital technologies (Skinner 2018; Jagtiani & Kose 2018; Tanda & Schena 2019) and their impact on consumer decisions currently stand at the forefront of international consumer policy discourse (Zopounidis et al. 2018; Bhatia, 2019). The use of modern technologies presents a clear opportunity to accelerate the transformation of the banking sector and give users greater control over their finances and increase the value of their investments. Asset management support technologies may play a new and promising role in supporting financial decisions that involve analysing decisions in circumstances of uncertainty and a huge diversity of possible decisions. The impact of modern financial technologies on data transfer and security, consumer privacy, as well as the responsibility of financial service providers on online platforms and digital consumer education are just some of the hot topics of our times (Świecka et al. 2020; Thorun & Diels 2020).

One form of automated financial consulting is robo-advice – defined as an automated investment platform that uses quantitative algorithms to manage investors' portfolios and accessible to clients online. Robo-advisors differ from existing online investment platforms or online brokerage with respect to two different conceptual levels: customer assessment, and customer portfolio management (Beketov et al. 2018; Jung et al. 2018). The solution is based on advanced algorithms using artificial intelligence and tools for analysing large data sets. The robo-advisor (online software) provides vital financial advice to their clients in a cost-effective manner with moderate to minimal human interventions (Balwani et al. 2019). Emergence of financial technologies ecosystem was preceded by three waves of technological disruptive changes: electronic payments, blockchain and cryptocurrencies, and artificial intelligence. The concept of artificial intelligence in the financial sector centers on devices that can interpret and understand tasks and take action to complete those financial tasks. For example, the devices might be robo-advice, digital brokers, or assorted devices used in trading, tax management, and trade decision making. Artificial intelligence offers a high degree of automation and efficiency improvements, which are most apparent in investment platforms and portfolio management (Palmiéa et al., 2020).

Robo-advisors have emerged from the entwinement of two strands of history represented by investment theory and AI-technology during the latter part of the 20th century. The leading robo-advisory models founded in today's AI-driven technological environment are mostly based on Modern Portfolio theory (MPT), based on an optimal portfolio for a given investor's risk preference. Therefore, behavioural finance is considered as one of the most realistic representation of financial markets and investor behaviour, which might eventually replace MPT as the paradigm of choice. This shift to behavioural finance received a further boost in 2017, with recent developments in AI-based machine learning, which have built the momentum through the possible combination of two investment philosophies (Shanmuganathan 2020).

Research into the implementation of robo-advisory solutions in practice is limited (D'Acunto et al., 2019). Literature and reports predominantly focus on technical, legal and market forecasting issues (Jl, 2017; Mordor Intelligence 2017; Netscribes 2018; Glaser et al. 2019; EIBIS 2020), excluding the use of robo-advice in personal

finance planning. The use of robo-advice has come under the microscope in the USA and China. Over one million Bank of America customers use the services of a chatbot (named Erica) to submit basic financial inquiries (Rosman, 2018). Another example of the practical use of modern technologies is the Bank of Tokyo (Marinova et al., 2017), where a banker-humanoid (named Nao) accompanies the client during a standard visit to the bank. Banks and entities from the fintech industry seek to popularise robo-advice services, claiming that they offer a competitive advantage. It is worth emphasising that the size of the market is expanding, and robo-advisers manage approximately USD 880,000 million of assets and have noted an annual increase of 30% (Statista.com 2019). Analyses conducted thus far (Lundahl et all 2009; Sabri 2011; Bhatnagar 2016; Iriobe & Oyinlola 2017) do not relate directly to an assessment regarding which socio-demographic traits – from a statistical point of view – may influence the level of satisfaction experienced by customers (Kim & Lim 2010) with the use of modern technologies in personal finance in terms of robo-advice and the monitoring of spending habits.

Progress in information technology (IT) and information systems (IS) provides firms with more options for replacing or supplementing personal service provision with self-service technologies (SST). Many of these technologies provide decision support to consumers either as their main purpose (apps, information terminals) or as a fringe benefit (self- scanning) (Djelassia et al., 2018). Robo-advice is an example of customer self-service technology (SST). SST is applicable, among others, in retail and financial services as a customer-centric strategy and fosters loyalty, trust, or word-of-mouth communication (Taillon & Huhmann 2017). One of the prominent benefits noted by customers is that self-service allows customers to have greater efficiency in a transaction and so they forego the full service option and purchase online (Collier & Barnes 2015).

The subject of Technology readiness (TR) of SSTs is also discussed in the literature, i.e. the customer's psychological willingness to accept new technologies. TR comprises four dimensions: innovativeness, optimism, discomfort and insecurity. Service providers introduce self-service technologies to increase productivity and efficiency and to offer customers access to services via new and convenient channels, thereby better meeting customer demands and boosting their satisfaction. The impact of TR on customers can be investigated by (1) attitude towards using SSTs, (2) adoption of SSTs, i.e. actual usage and (3) response to the firm in terms of perceived service quality, satisfaction and loyalty to an SST (Liljandera, Gillberg, Gummerus, Rie 2006). Other dimensions of TR are innovativeness and optimism and they have a positive impact on the customers' decisions to use self-service technologies while discomfort and insecurity have a negative impact (Gelderman et al. 2011). SST service quality can be measured by examining many dimensions including functionality, enjoyment, security, assurance, design, customisation and convenience. The quality of self-service technology in retail banking services consists of four elements – consistency, dependability, timeliness and technology – based on two popular dimensions, which are reliability and responsiveness and their influence on customer satisfaction (Iberahim, et al. 2016). The literature also discusses the positive relationship between a self-service technology investment and solid financial performance (Hung et al. 2012). Buyers' continued usage of SSTs depends on their acceptance of the technology and their satisfaction with service delivery based on two different lines of research: technology acceptance and service/relationship marketing. Buyers who are satisfied tend to continue their usage, whereas dissatisfied buyers withdraw (Erikkson & Nilson 2007). There are no studies on socio-economic factors affecting the satisfaction of using self-service services based on the example of robo-advice. This indicates the existence of a research gap, which the results of the study and their analysis presented in the article intend to fill.

One of the main theories related to the customer self-service process is that of resource matching (Anand & Sternthal 1999) and its further theoretical development within the field of efficiency (Collier & Kimes 2012; Zhu et al. 2007). This theory is a reference point for environments where performance is the key goal. Unfortunately, it cannot be fully applied to analyses regarding remote consumer service channels in the financial sector, as it is not

appropriate for the dynamics of action and operations performed independently. The theory of consumption values focuses on efficiency (which better describes consumer behaviour in the digital financial services market), explaining why consumers decide to buy (Sheth et al. 1991). Financial service providers using remote applications strive towards increased efficiency, performance and diversification of communication channels (Liljander et al. 2006; Collier & Barnes 2015; Iberahim et al. 2015). Customer self-services enables a new service model to be created that bases its assumptions on the equal involvement of investors and bidders in the financial management process and can influence the establishment of long-term relationships between the parties involved (Djelassi et al. 2018). Most financial institutions do not take advantage of customer self-service potential because they base their assumptions on an incomplete business model in the area of remote service. Remote financial management support services are focused on the speed of response to reported needs, reducing service time, convenience for customers and lowering costs for the service provider (Boon-itt 2015). Innovation in finance may go hand in hand with consumer discomfort arising from lack of control over modern tools, uncertainty of their knowledge and skills, lack of confidence in technology and a sense of technological overwhelm (Parasurman 2000).

One of the objectives of using modern technologies is to support consumer decision-making processes and adapt modern financial services to evolving needs (Buettner 2017; Nitin et al. 2019). Robo-advice facilitates management by providing potential investors with investment guidelines regarding the benefits of investing. Implementing a new path of communication with the recipient requires in-depth research into consumer behaviour, knowledge of which is necessary not only when it comes to understanding purchasing decisions, but also in order to create tailor-made products and predict the future evolution of customers' decisions (Mazurek, Maz 2019). Analysis of consumer attitudes significantly affects preferences and further predictions based on the personality of the user (Blackwell et al. 2005). The assessment of alternatives in the financial decision making process (Beckett et al. 2000) is a multi-stage process, which consists of (a) forming opinions on possible methods of satisfying needs, (b) shaping attitudes towards them and (c) establishing a purchase. This scheme draws on previously accumulated information and experience. Therefore, the challenge is the diagnosis of which determinants may be significant to the consumer in order to shift financial management towards robo-advice. The implementation of modern technologies in the process of personal finance management offers a number of challenges in the area of data circulation and analysis, digitisation and the automation of manual processes, as well as big data architecture.

The purpose of the article is to diagnose the sociological and economic determinants underlying consumer satisfaction in terms of planning personal finances using modern technologies. The paper is organised as follows. At the beginning the article presents the research methodology, after which the authors outline the main results of their worldwide survey. Subsequently, the discussion of the results is shown, whereupon the authors conclude by listing limitations and offering future research options.

2. Methodology

The statistical material used in the article stems from the *ING International Survey – New Technologies 2019*. This online survey was carried out by Ipsos from 30 January to 11 February 2019. Sampling reflects gender ratios and age distribution, selecting from pools of possible respondents furnished by panel providers in each country. European consumer figures are expressed as an average, weighted to take the varying populations of the countries into account. 14,824 respondents from 15 countries (Austria, Belgium, Czech Republic, Germany, France, Italy, Luxembourg, Netherlands, Poland, Romania, Spain, Turkey, United Kingdom, USA, Australia) were involved in

the survey. The article uses data for Poland made available directly by ING Bank Śląski economists for scientific purposes. 14,824 respondents were surveyed, whose descriptive statistics are presented in Table 1.

Table 1. Descriptive statistics of the studied population (N = 14,824)

Characteristics	Variants of the characteristics	Austria	Belgium	Czech Republic	Germany	France	Italy	Luxembourg	Netherlands	Poland	Romania	Spain	Turkey	United Kingdom	USA	Australia
		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Age	18-35	221	199	284	181	179	174	129	194	268	298	190	396	180	230	149
	36-45	257	266	341	277	283	310	197	275	245	381	332	358	299	247	240
	46-65	430	376	332	408	357	418	254	311	416	311	413	243	353	367	343
	Over 66	99	174	78	139	192	105	69	234	87	36	66	14	184	160	275
Gender	Female	516	516	521	523	517	504	312	519	537	524	507	513	500	510	504
	Male	491	499	514	482	494	503	337	495	479	502	494	498	516	494	503
Employment	Student	52	62	71	51	50	61	44	40	41	59	47	111	28	27	30
	Unemployed	100	219	104	151	99	212	41	198	93	152	203	80	197	193	190
	Employed	543	438	650	513	545	462	396	482	626	621	581	692	519	506	420
	Self-employed	58	33	59	39	43	115	29	57	74	79	55	46	58	62	66
	Retired	254	263	151	251	274	157	139	237	182	115	115	82	214	216	301
Household	1 person	235	230	134	222	295	106	92	262	94	81	83	41	217	190	223
	2 people	392	352	334	377	419	265	213	396	256	278	268	123	358	358	412
	3 people	197	226	274	201	153	293	145	174	263	316	304	293	194	189	186
	4 people	128	137	200	145	110	261	142	122	258	232	271	335	174	155	121
	5 people	40	46	64	44	25	72	44	43	103	78	59	163	53	64	40
	6 or more	15	24	29	16	9	10	13	17	42	41	16	56	20	48	25
Education	Primary	69	46	65	62	185	105	42	266	27	124	102	161	215	273	284
	Secondary	489	443	625	375	382	529	201	381	500	112	274	130	305	236	245
	Vocational	245	267	136	172	216	51	167	223	58	523	165	90	151	166	174
	BA	82	132	68	214	84	270	115	47	123	180	328	493	233	225	200
	MA	122	127	141	182	144	52	124	97	308	87	132	137	112	104	104
Income (euro)	0-249	13	9	15	17	7	10	2	6	39	77	8	23	18	22	20

250-499	13	10	58	20	22	20	3	17	83	202	20	20	39	24	30
500-999	55	32	231	57	79	64	7	36	285	314	85	120	84	82	94
1000-1499	128	122	304	119	129	145	5	119	263	174	190	120	162	106	135
1500-1999	117	145	170	146	120	162	7	131	131	77	187	151	114	81	88
2000-2499	125	142	77	126	145	130	16	151	78	36	130	102	93	94	98
2500-2999	108	99	34	111	127	103	27	100	21	13	107	88	88	74	76
3000-3499	77	103	6	102	81	77	39	88	11	4	69	88	71	64	70
3500-3999	89	61	5	68	83	52	40	66	5	2	49	59	54	73	50
4000-4999	53	58	4	81	62	43	66	48	2	6	42	51	79	77	64
5000-5999	28	29	2	32	27	17	75	14	0	5	12	39	41	59	42
6000-6999	11	10	2	13	10	8	70	5	5	2	9	33	27	44	26
7000+	15	7	4	18	11	14	152	12	8	9	3	53	30	90	48

Source: ING International Survey – New Technologies (2019).

Regarding the use of modern technologies in personal financial management, the respondents were presented with two statements to evaluate their level of satisfaction:
1) I would be happy for a computer program to make investment decisions on my behalf.
2) I would be happy for a computer program to analyse my spending habits and recommend improvements.

The respondents responded to these statements on a 5-point Likert scale: 1 – totally disagree, 2 – disagree, 3 – difficult to say, 4 –agree, 5 – totally agree.

In order to analyse the date, the following statistical methods were employed:
1) The Chi-square test for independence: a nonparametric method for testing the relationship between two variables expressed on a qualitative scale. These were socio-demographic variables with 2 questions on a 5-point scale.
2) The Mann-Whitney U test: a nonparametric test for studying the differences between 2 groups. In this case, Poland is compared with each country in turn, and the average acceptance value of robo-advice in terms of qualitative sociodemographic variables (gender, work) was compared in different countries.
3) Spearman's rho correlation coefficient: a nonparametric test used to examine the relationship between two variables expressed on the ordinal scale. Applied to the relationship between the survey and socio-demographic questions that were graded (rated on a scale from the lowest to the highest).

The following research hypotheses were formulated:
H1: There are statistically significant differences between Poland and the other countries analysed (apart from Italy and Spain) in terms of the acceptance of robo-advice for making investment decisions as well as for a computer program to analyse expenditure and suggest improvements.
H2: In most of the countries studied, age is associated with a lower acceptance for a computer program to make investment decisions, analyse expenditure and recommend improvements.
H3: In most countries, the willingness to allow a computer program to make investment decisions – along with the willingness for a computer program to analyse spending habits and recommend improvements – is proportional to the number of people in the household.
H4: Acceptance for a computer to make investment decisions, analyse expenditure and recommend improvements is inversely proportional to age.

H5:   Most countries feature statistically significant differences between men and women in terms of accepting robo-advice for investment and there is no difference in terms of accepting a computer program to make expenditure analysis and recommend improvements (apart from Germany, the Netherlands and Turkey).

H6:   In most countries there are differences between working and non-working people in terms of accepting robo-advice for investment or as a means of analysing expenses and suggesting improvements.

3. Research background

Table 2 presents the most significant robo-advisor parameters in Europe. Assets under management in Europe amounts to USD 49,471m in 2020 in the robo-advisor segment. Assets under management are expected to show an annual growth rate (CAGR 2020-2023) of 35.2% resulting in a total amount of USD 122,312 million by 2023. In the robo-advisor segment, the number of users is expected to amount to 4,005.1 thousand by 2023 from 2,173 thousand in 2020. The average assets under management per user in the robo-advisor segment amounts to USD 22,767 in 2020 and is expected to grow to USD 30,539.

Table 2. Robo-advisors in Europe

Key characteristics	2017	2018	2019	2020	2021	2022	2023
Assets under Management (in million USD)	7 365,0	15 925,0	30 052,0	49 471,0	72 689,0	97 626,0	122 312,0
Assets under Management Growth (in percentages)	-	116,20	88,70	64,60	46,90	34,30	25,30
Users in thousands	562,90	962,50	1 509,10	2 173,00	2 891,30	3 506,20	4 005,10
Penetration Rate (in percentages)	0,10	0,10	0,20	0,30	0,30	0,40	0,50
Assets under Management per User in USD	13 085,0	16 546,0	19 914,0	22 767,0	25 141,0	27 844,0	30 539,0

Source: Statista.com (2020).
Note: penetration rate is the share of active paying customers (or accounts) from the total population of the selected market (market segment, region) for each year.

Taking into account only the 15 countries studied, assets under management by robo-advisors are presented in Fig. 1. According to data for 2020, the total value of these assets amounted to USD 43,032.0 million projected to rise by 2023 to a level of 106,590.0 million USD. The largest markets were Germany and the United Kingdom, accounting for 32% and 52% of assets under management respectively of all the countries surveyed.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
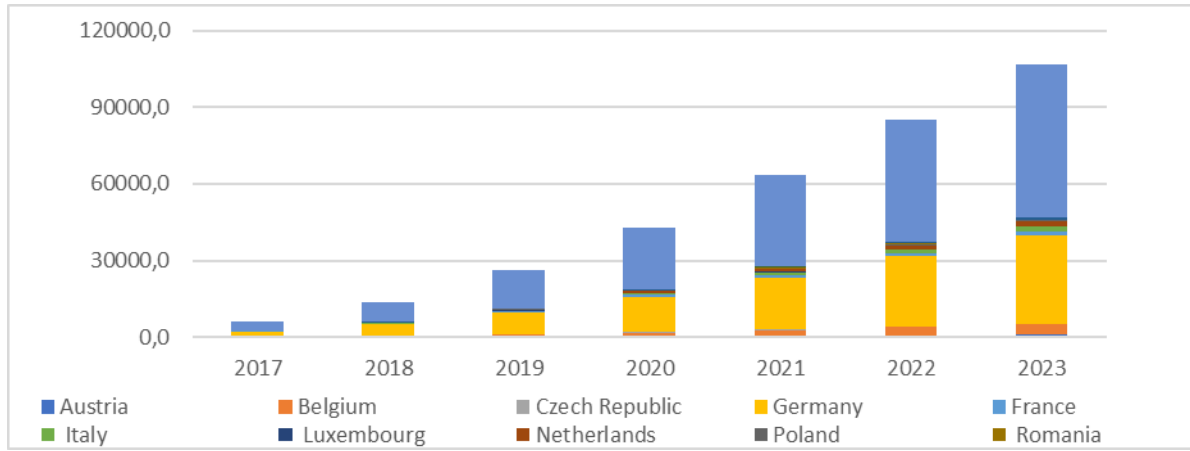

Fig. 1. Assets under Management of robo-advisors in million USD in selected European countries
Source: Statista.com (2020)

Taking into account the users of robo-advisors in the 15 European countries surveyed (Fig. 2), in 2020 there were 1635.00 thousand projected to rise by 2023 to 2867.3 thousand. Most users of this service are in Germany and the United Kingdom, accounting for 27% and 46% respectively of all users among the countries surveyed.
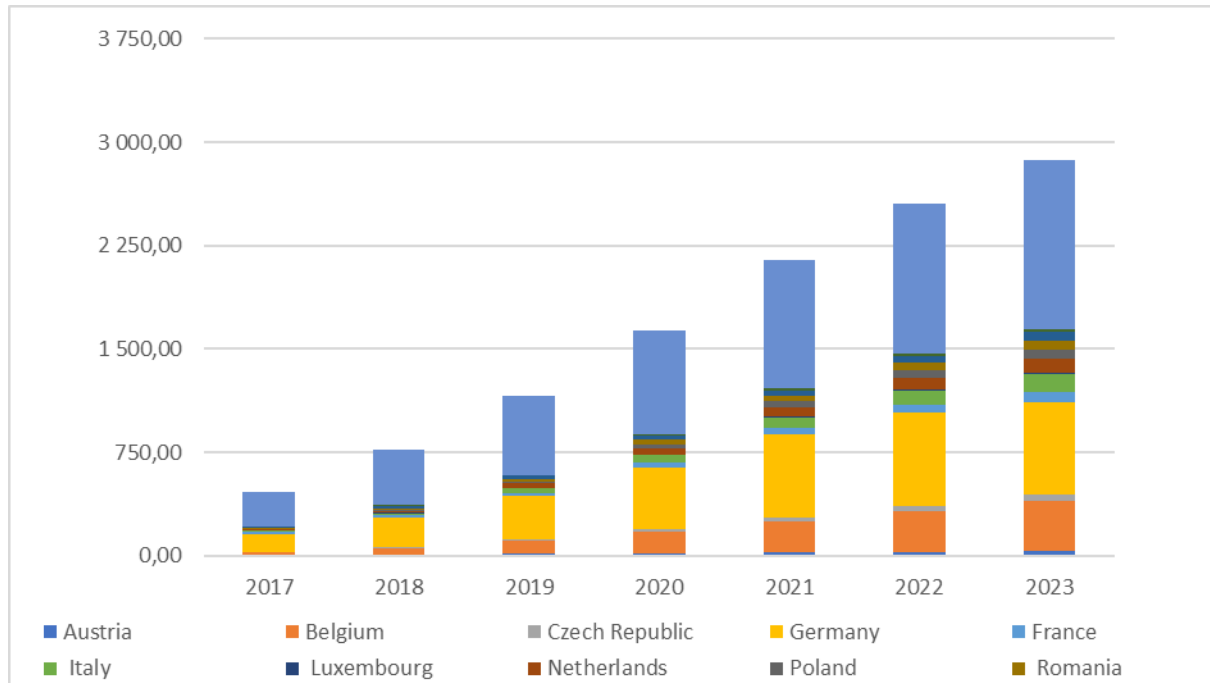
Fig. 2. Users of robo-advisors in thousands in selected European countries
Source: Statista.com (2020)

Fig. 3 and 4 present the structure of answers to 2 questions presented to the respondents. The first question concerned financial robo-advice supporting investment decisions. In the case of the European countries studied, the average of the responses was 18% agree, 21% neither agree or disagree and 61% disagree. Countries with the greatest levels of satisfaction with financial robo-advice include Turkey (30%), Romania (21%), Czech Republic

(20%), UK (19%), Poland (18%) as well as Spain and Italy (17%). For the USA, 22% responded 'agree'. The second question concerned satisfaction a computer program analysing spending habits and suggesting improvements (Fig. 2). For the second question, the percentage of those satisfied was higher than the first. The average 'agree' response for the European countries studied was 38%, and the highest level of satisfaction was indicated by respondents from Turkey (65%), Romania (53%), Poland (45%), Czech Republic (42%), Spain (41%), Luxembourg (35%) and the UK (34%). In the case of the USA, the percentage of respondents indicating satisfaction was the same as the European countries studied and amounted to 38%.
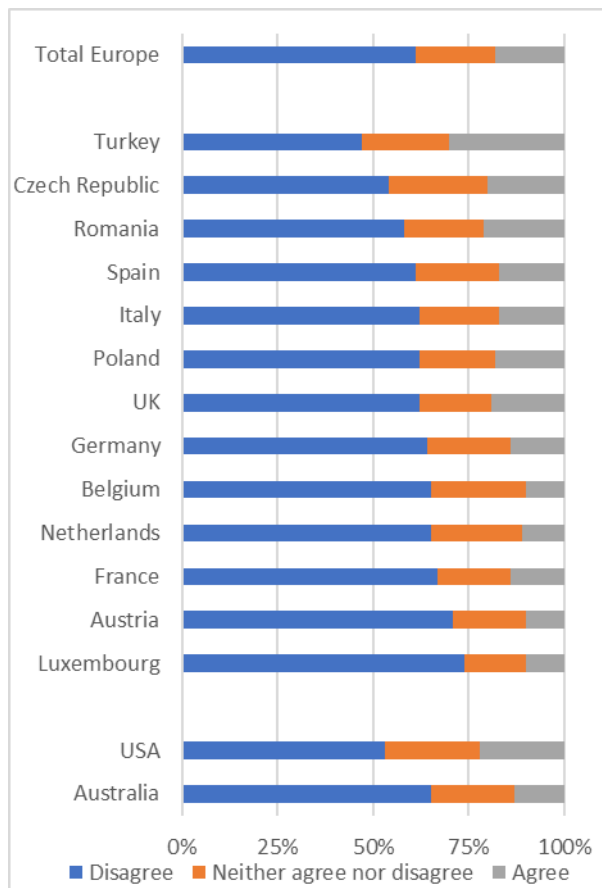

Fig. 3. I would be happy for a computer program to make investment decisions on my behalf
Source: ING International Survey – New Technologies (2019); Note: The 'disagree' category includes 'totally disagree' and 'disagree', and the 'agree' category includes 'totally agree' and 'agree'.
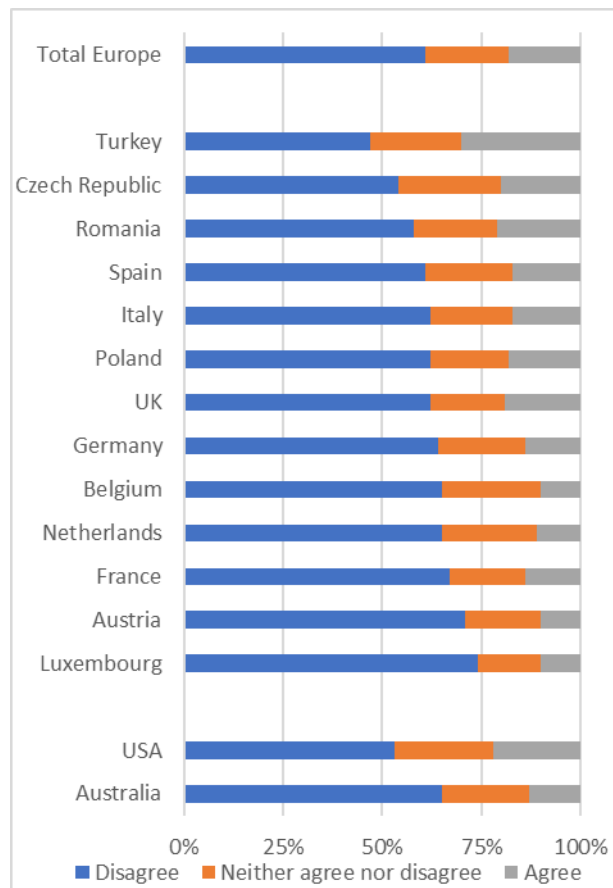
Fig. 4. I would be happy for a computer program to analyse my spending habits and recommend improvements
Source: ING International Survey – New Technologies (2019).

Subsequently, in the first stage of the study, the Poles' opinion on financial robo-advice was compared with the opinion of residents of other countries in this respect. Comparative analyses were performed using a series of Mann-Whitney U tests. Table 3 presents the results of the comparative analyses together with descriptive statistics for opinions on financial robo-advice for making investment decisions by country.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Table 3. Descriptive statistics for opinions on financial robo-advice for making investment decisions by country and the results of comparative analyses via Mann-Whitney U tests

I would be happy for a computer program to make investment decisions on my behalf	M	SD	Z	p	r
Poland	2,35	1,16		-	
Australia	2,11	1,11	4,69	***	0,10
Austria	1,93	1,09	8,87	***	0,20
Belgium	2,11	1,08	4,52	***	0,10
Czech Republic	2,50	1,10	3,54	***	0,08
France	2,09	1,17	5,63	***	0,13
Germany	2,11	1,20	5,20	***	0,12
Italy	2,28	1,18	1,53	0,126n.s.	0,03
Luxembourg	2,01	1,03	5,83	***	0,14
Netherlands	2,12	1,08	4,21	***	0,09
Romania	2,49	1,24	2,35	*	0,05
Spain	2,29	1,19	1,43	0,152n.s.	0,03
Turkey	2,78	1,31	7,43	***	0,17
UK	2,23	1,25	3,21	**	0,07
USA	2,48	1,25	2,11	*	0,05

M – mean, SD – standard deviation, Me – median, Z – U Mann-Whitney statistic, p – level of statistical significance, r – strength of effects, *p<0,05, **p<0,01, ***p<0,001, n.s. – statistically insignificant

The results of the Mann-Whitney U tests proved to be statistically significant, which means that there were differences between Poland and the other countries in terms of acceptance of robo-advice for making investment decisions. Only statistically significant differences between Poland and Italy were not indicated $Z = 1.53$; $p = 0.126$; $V = 0.03$ and Spain $Z = 1.11$; $p = 0.265$; $V = 0.03$.

Countries featuring a higher level of acceptance of investment advice for investments included Turkey, the Czech Republic, Romania and the USA. Other countries indicated a lower rate of acceptance of this advisory function, and the lowest value was found for Austria and Luxembourg. Based on the r strength of effect ratio, it can be concluded that the differences were most marked between Poland and Australia and Luxembourg.

Similarly, by means of a series of multiple comparisons via Mann-Whitney U tests, a study was conducted into whether and how Poles differed from other nationalities in terms of robo-advice given by a computer program for analysing expenses and suggesting improvements.

Table 4. Descriptive statistics for opinions on financial robo-advice in terms of analysing habits related to expenditure by country and the results of comparative analyses via Mann-Whitney U tests

I would be happy for a computer program to analyse my spending habits and recommend improvements	*M*	*SD*	*Z*	*p*	*r*
Poland	3,23	1,14		-	
Australia	2,66	1,19	10,49	***	0,23
Austria	2,55	1,29	11,97	***	0,27
Belgium	2,71	1,17	9,77	***	0,22
Czech Republic	3,11	1,16	2,19	*	0,05
France	2,71	1,30	9,15	***	0,20
Germany	2,55	1,30	11,93	***	0,26
Italy	2,98	1,17	4,62	***	0,10
Luxembourg	2,82	1,26	6,49	***	0,16
Netherlands	2,66	1,12	10,93	***	0,24
Romania	3,44	1,23	4,40	***	0,10
Spain	3,09	1,24	2,39	*	0,05
Turkey	3,80	1,15	11,43	***	0,25
UK	2,77	1,28	8,10	***	0,18
USA	2,99	1,28	4,12	***	0,09

M – mean, SD – standard deviation, Me – median, Z – U Mann-Whitney statistic, p – level of statistical significance, r – strength effects,
*p<0,05, **p<0,01, ***p<0,001, n.s. – statistically insignificant

All results of the Mann-Whitney U analyses turned out to be statistically significant p <0.001. Therefore, citizens of different nationalities differed in their willingness for a computer to analyse their expenditure. Turkey and Romania featured a higher level of acceptance of robo-advice for spending analysis than Poland. The greatest reluctance to have a computer program give financial advice was expressed by the inhabitants of Austria and Germany.

Next, a study was conducted as to whether acceptance of robo-advice was related in different degrees to sociodemographic variables in Poland and other countries. Spearman's rho correlation analysis was used for variables measured on the ordinal scale. Table 5 presents the results of correlation analyses for the relationship between sociodemographic variables and the acceptance of financial robo-advice for making investment decisions by country.

Table 5. Results of Spearman's rho correlation analysis for the relationship between sociodemographic variables and acceptance of financial robo-advice for making investment decisions by country

I would be happy for a computer program to make investment decisions on my behalf	Age	Qualification	Number of people in the household	Income
Poland	-0,03	-0,02	0,07*	-0,03
Australia	-0,34***	0,09**	0,15***	0,04
Austria	-0,10***	0,05	0,11***	-0,07*
Belgium	-0,18***	-0,04	0,12***	-0,03
Czech Republic	0,00	-0,02	0,04	-0,01
France	-0,21***	0,07*	0,14***	0,01
Germany	-0,23***	0,11***	0,12***	0,06
Italy	-0,10**	0,08*	0,10**	0,08*
Luxembourg	-0,13***	-0,05	0,05	-0,09*
Netherlands	-0,19***	0,14***	0,16***	0,15***
Romania	-0,08**	-0,13***	0,03	-0,09**
Spain	-0,11***	0,12***	0,11***	0,04
Turkey	0,05	0,13***	0,07*	0,17***
UK	-0,36***	0,06	0,19***	0,06
USA	-0,34***	-0,01	0,13***	-0,02

*$p<0,05$, **$p<0,01$, ***$p<0,001$

The results of correlation analyses demonstrate that in most countries age was associated with a decrease in acceptance for a computer program to make investment decisions. In the United Kingdom, the strongest relationship in this respect was $\rho = -0.36$; $p <0.001$, then the USA $\rho = -0.34$; $p <0.001$ and Australia $\rho = -0.34$; $p <0.001$. Furthermore, in most countries, the willingness for a computer program to make investment decisions was proportional to the number of people in the household. In the United Kingdom, the strongest relationship in this respect was $\rho = 0.19$; $p <0.001$.

In the case of countries such as Italy, the Netherlands and Turkey, high acceptance for a computer program to make investment decisions was demonstrated to be associated with higher levels of education and income. It is interesting that the exact opposite relationship occurred in the case of Romania.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Table 6. Results of Spearman's rho correlation analysis for the relationship between sociodemographic variables and acceptance of financial robo-advice in analysing spending habits by country

I would be happy for a computer program to analyse my spending habits and recommend improvements	Age	Qualification	Number of people in the household	Income
Poland	-0,24***	-0,02	0,11***	-0,04
Australia	-0,32***	0,08*	0,14***	0,06
Austria	-0,15***	-0,033	0,13***	-0,02
Belgium	-0,18***	-0,07*	0,08*	-0,01
Czech Republic	-0,13***	-0,06*	0,06	0,02
France	-0,21***	-0,015	0,15***	0,00
Germany	-0,23***	0,08**	0,12***	0,07*
Italy	-0,19***	0,06	0,14***	0,07*
Luxembourg	-0,17***	-0,04	0,10**	-0,10*
Netherlands	-0,20***	0,13***	0,17***	0,15***
Romania	-0,12***	-0,12***	0,04	-0,11**
Spain	-0,22***	0,07*	0,13***	0,06
Turkey	-0,10**	0,17***	0,13***	0,20**
UK	-0,37***	0,07*	0,19***	0,10**
USA	-0,31***	-0,01	0,20***	-0,01

*$p<0,05$, **$p<0,01$, ***$p<0,001$

For all the countries studied, correlation analyses revealed that as age increased, the acceptance of a computer analysing expenses and recommending improvements decreased. The strongest relationships in this area were also shown by the United Kingdom $\rho = -0.37$; $p <0.001$, then the USA $\rho = -0.31$; $p <0.001$ and Australia $\rho = -0.32$; $p <0.001$, with Turkey having the weakest $\rho = -0.10$; $p <0.01$. Also in most countries, the number of people in the household proved to be proportional to the willingness for a computer program to analyse spending habits and recommend improvements. This relationship was also the strongest in the United Kingdom $\rho = 0.19$; $p <0.001$ and the USA $\rho = 0.20$; $p <0.001$.

Further analysis indicated that for countries such as Germany, the Netherlands, Turkey and the United Kingdom, high acceptance for a computer program to analyse expenditure was associated with higher education and income levels. Romania is the only case where people with a university degree and higher earnings are less willing to have a computer analyse expenses and recommend improvements.

A study was also conducted as to which countries featured a differentiated level of acceptance of financial advice by gender. For this purpose, comparative analyses were carried out using Mann-Whitney U tests.

Table 7. Descriptive statistics for opinions on financial robo-advice in terms of making investment decisions by country and gender as well as the results of comparative analyses via Mann-Whitney U tests

I would be happy for a computer program to make investment decisions on my behalf	Women		Men		Z	p	r
	M	SD	M	SD			
Poland	2,34	1,15	2,36	1,17	0,28	0,780n.s.	0,01
Australia	2,03	1,04	2,20	1,17	1,97	*	0,06
Austria	1,78	0,96	2,08	1,19	3,66	***	0,12
Belgium	2,02	1,03	2,21	1,13	2,57	*	0,08
Czech Republic	2,46	1,05	2,53	1,16	0,91	0,363n.s.	0,03
France	2,00	1,14	2,19	1,21	2,47	*	0,08
Germany	1,91	1,06	2,33	1,30	5,10	***	0,16
Italy	2,15	1,12	2,41	1,22	3,32	**	0,10
Luxembourg	1,91	1,02	2,11	1,04	2,77	**	0,11
Netherlands	1,98	1,01	2,28	1,13	4,28	***	0,13
Romania	2,41	1,17	2,57	1,31	1,66	0,097n.s.	0,05
Spain	2,23	1,16	2,34	1,21	1,28	0,199n.s.	0,04
Turkey	2,79	1,31	2,78	1,32	0,10	0,924n.s.	0,00
UK	2,09	1,19	2,36	1,30	3,32	**	0,10
USA	2,35	1,23	2,61	1,26	3,33	**	0,11

*M – mean, SD – standard deviation, Me – median, Z – U Mann-Whitney statistic, p – level of statistical significance, r – strength effects, *p<0,05, **p<0,01, ***p<0,001, n.s. – statistically insignificant*

The results of the Mann-Whitney U tests proved to be significant, which means that the countries analysed do feature differences between men and women in terms of accepting robo-advice for investment. No such gender differences were found in Poland Z = 0.28; p = 0.780; r = 0.01, the Czech Republic Z = 0.91; p = 0.363; r = 0.03, Romania Z = 1.66; p = 0.097; r = 0.05, Spain Z = 1.28; p = 0.199; r = 0.04 or Turkey with Z = 0.10; p = 0.924; r = 0.00. In all other countries, men were more willing than women to have a computer make investment decisions for them, and the largest gender differences were found among the inhabitants of Germany and Austria.

Table 8. Descriptive statistics for opinions on financial robo-advice in terms of analysing spending habits by country and gender as well as the results of comparative analyses via Mann-Whitney U tests

I would be happy for a computer program to analyse my spending habits and recommend improvements	Women		Men		Z	p	r
	M	SD	M	SD			
Poland	3,28	1,13	3,16	1,15	1,52	0,128n.s.	0,05
Australia	2,64	1,20	2,68	1,19	0,42	0,673n.s.	0,01
Austria	2,50	1,26	2,60	1,32	1,04	0,296n.s.	0,03
Belgium	2,70	1,17	2,72	1,18	0,37	0,712n.s.	0,01
Czech Republic	3,06	1,13	3,16	1,18	1,63	0,104n.s.	0,05
France	2,69	1,29	2,72	1,31	0,25	0,804n.s.	0,01
Germany	2,38	1,21	2,72	1,37	3,80	***	0,12
Italy	2,95	1,18	3,01	1,17	0,89	0,373n.s.	0,03
Luxembourg	2,76	1,28	2,87	1,25	1,06	0,289n.s.	0,04
Netherlands	2,54	1,13	2,78	1,10	3,59	***	0,11
Romania	3,45	1,21	3,43	1,26	0,04	0,968n.s.	0,00
Spain	3,09	1,25	3,08	1,24	0,23	0,819	0,01
Turkey	3,94	1,07	3,64	1,22	3,79	***	0,12
UK	2,70	1,26	2,83	1,31	1,59	0,111n.s.	0,05
USA	2,95	1,27	3,03	1,29	1,08	0,278n.s.	0,03

M – mean, SD – standard deviation, Me – median, Z – U Mann-Whitney statistic, p – level of statistical significance, r – strength effects,
*p<0,05, **p<0,01, ***p<0,001, n.s. – statistically insignificant

The results of the Mann-Whitney U test were mostly insignificant, which means that there were no differences between men and women in the analysed countries in terms of acceptance of robo-advice for analysing expenses and recommending improvements. Such differences were only demonstrated for Germany $Z = 3.80$; $p < 0.001$; $r = 0.12$, the Netherlands $Z = 3.59$; $p < 0.001$; $r = 0.11$ and Turkey $Z = 3.79$; $p < 0.001$; $r = 0.12$. In the case of Germany and the Netherlands, men were more likely to have a computer analyse their expenses, while in the case of Turkey, women were more likely to do so. People working (employed or self-employed) were also compared with those not working (at school/at university/retired/unemployed) in terms of their evaluation of financial robo-advice by country.

Table 9. Descriptive statistics for opinions on financial robo-advice in terms of making investment decisions by country and employment as well as the results of comparative analyses via Mann-Whitney U tests

I would be happy for a computer program to make investment decisions on my behalf	Working people		Non-working people		Z	p	r
	M	SD	M	SD			
Poland	2,34	1,03	2,35	1,21	0,71	0,477n.s.	0,02
Australia	1,87	0,98	2,37	1,19	6,89	***	0,22
Austria	1,90	1,07	1,95	1,10	0,68	0,495n.s.	0,02
Belgium	2,01	1,04	2,22	1,12	2,98	**	0,09
Czech Republic	2,45	1,04	2,52	1,13	0,57	0,569n.s.	0,02
France	1,86	0,97	2,28	1,28	4,71	***	0,15
Germany	1,92	1,10	2,25	1,25	4,12	***	0,13
Italy	2,07	1,09	2,43	1,21	4,79	***	0,15
Luxembourg	1,90	0,94	2,07	1,07	1,70	0,089n.s.	0,07
Netherlands	1,92	0,98	2,30	1,13	5,38	***	0,17
Romania	2,39	1,18	2,54	1,26	1,61	0,107n.s.	0,05
Spain	2,11	1,12	2,39	1,21	3,51	***	0,11
Turkey	2,45	1,19	2,91	1,34	4,84	***	0,15
UK	1,86	1,10	2,51	1,29	8,45	***	0,26
USA	2,21	1,14	2,68	1,30	5,73	***	0,18

M – mean, SD – standard deviation, Me – median, Z – U Mann-Whitney statistic, p – level of statistical significance, r – strength effects, *p<0,05, **p<0,01, ***p<0,001, n.s. – statistically insignificant

The results of the Mann-Whitney U tests proved to be significant for the most part, which means that the countries analysed do feature differences between working and non-working people in terms of their acceptance of robo-advice advice for investment. No such differences were found for Poland Z = 0.71; p = 0.477; r = 0.02, Austria Z = 0.68; p = 0.495; r = 0.02, Czechs Z = 0.57; p = 0.569; r = 0.02, Luxembourg Z = 1.70; p = 0.089; r = 0.07 or Romania Z = 1.61; p = 0.107; r = 0.05. In the remaining countries, it was shown that working people were more favourably inclined to robo-advice for investment and the widest differences were found in the case of the United Kingdom.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Table 10. Descriptive statistics for opinions on financial robo-advice in terms of analysing spending habits by country and employment as well as the results of comparative analyses via Mann-Whitney U tests

I would be happy for a computer program to analyse my spending habits and recommend improvements	Non-Working people		Working people		Z	p	r
	M	SD	M	SD			
Poland	3,19	1,10	3,24	1,16	0,94	0,350n.s.	0,03
Australia	2,42	1,16	2,91	1,18	6,41	***	0,20
Austria	2,50	1,24	2,59	1,32	1,02	0,309n.s.	0,03
Belgium	2,62	1,17	2,81	1,17	2,78	***	0,09
Czech Republic	3,10	1,13	3,12	1,17	0,31	0,754n.s.	0,01
France	2,53	1,25	2,85	1,32	3,96	***	0,12
Germany	2,33	1,25	2,70	1,32	4,44	***	0,14
Italy	2,82	1,18	3,10	1,16	3,79	***	0,12
Luxembourg	2,59	1,18	2,94	1,29	3,29	**	0,13
Netherlands	2,48	1,11	2,81	1,11	4,78	***	0,15
Romania	3,45	1,25	3,43	1,23	0,42	0,677n.s.	0,01
Spain	2,92	1,28	3,18	1,21	3,26	**	0,10
Turkey	3,48	1,22	3,91	1,11	5,14	***	0,16
UK	2,40	1,25	3,05	1,24	8,04	***	0,25
USA	2,76	1,25	3,17	1,27	5,05	***	0,16

*M – mean, SD – standard deviation, Me – median, Z – U Mann-Whitney statistic, p – level of statistical significance, r – strength effects, *p<0,05, **p<0,01, ***p<0,001, n.s. – statistically insignificant*

The results of the Mann-Whitney U tests again proved to be largely significant, which means that in the countries analysed there were differences between working and non-working people in terms of their acceptance of robo-advice for spending analysis. Such differences were not found in Poland Z = 0.94; p = 0.350; r = 0.03, Austria Z = 1.02; p = 0.309; r = 0.03, Czechs Z = 0.31; p = 0.754; r = 0.01 or Romania Z = 0.42; p = 0.677; r = 0.01. In other countries, working people would be more likely to use robo-advice for spending analysis and recommendations for improvement than non-working people. Here too, the most extreme differences were observed in the United Kingdom.

4. Discussion

Analyses on robo-advice have thus far focused on technical and legal issues, while also attempting to forecast the growth of the robo-advice market (Jl, 2017; Mordor Intelligence 2017; Netscribes 2018; Glaser et al. 2019; EIBIS 2020). This study supplements the research approach with an analysis of how socioeconomic factors impact the use of modern technologies in the process of personal finance management. The study determines the statistical significance and strength of the relationship between the individual socio-demographic characteristics presented by the respondents – such as age, gender, employment, number of people in the household, education, income – and their satisfaction with using modern robo-advice technologies in personal finance and a computer program to monitor spending habits and suggest improvements.

In the authors's opinion, interesting conclusions can be drawn from analysis on the impact of psychological and cultural factors on the use of modern technologies to manage personal finances. For the issue in question, this represents a gap in research.

The study gives the following contribution to the literature on the subject: satisfaction with the use of modern technologies in planning personal finances on the example of robo-advice and home budget control depends on socio-demographic variables - age, (except for the control of the home budget by a computer program), income in the household, education, number of people in the household, forms of professional activity.

The direction that further research needs to take is to diagnose why consumers are more satisfied with the use of a computer program to analyse expenditure than with making investment decisions. The study has provided a rationale for analysing the relationship between personality, temperament, risk aversion, sense of security and style of spending.

5. Conclusion

Based on the empirical material collected, the International Survey – New Technologies 2019 found that the percentage of respondents indicating their satisfaction with using a computer program to analyse spending habits was higher than in the case of responses about the use of a computer program to make investment decisions on behalf of the consumer.

The analysis results of the Mann-Whitney U tests proved to be statistically significant, which means that there were indeed differences between Poland and the other countries in terms of accepting robo-advice to make investment decisions. Only between Poland, Italy and Spain were statistically significant differences not demonstrated. Countries with a higher level of acceptance for robo-advice given for investments included Turkey, the Czech Republic, Romania and the USA. The remaining countries had a lower acceptance rate for this robo-advice feature, with Austria and Luxembourg having the lowest. Based on the r strength of effect ratio, it can be stated that the strongest differences were observed between Poland, Australia and Luxembourg. All the analysis results yielded by the Mann-Whitney U tests proved statistically significant. Citizens of different nationalities differed in their willingness to let a computer analyse their expenditure. Turkey and Romania feature a higher level of acceptance than Poland of robo-advice for expenditure analysis. The inhabitants of Austria and Germany expressed the most reluctance to have a computer program give financial advice. H1 was confirmed.

The results of correlation analyses showed that in most countries age was associated with less acceptance for a computer program to make investment decisions. The strongest relationship in this regard was in the case of the United Kingdom, followed by the USA and Australia. Also in most countries, the willingness for a computer program to make investment decisions was proportional to the number of people in the household, with the United Kingdom featuring the strongest relationship in this regard. For all analysed countries, correlation analyses showed that age is inversely proportional to the acceptance of a computer for analysing expenses and recommending improvements. The strongest relationships in this regard were also demonstrated in the United Kingdom, followed by the USA and Australia, with Turkey having the weakest correlation. Furthermore, in most countries, the higher the number of people in the household, the greater the willingness for a computer program to analyse spending habits and recommend improvements. This relationship was also the strongest in the case of the United Kingdom and the USA. H2 was found to be true.

Also in most countries, more people in the household translated into a greater willingness for a computer program to make investment decisions, with the United Kingdom featuring the strongest correlation in this regard. Additionally, in most countries the number of people in the household was proportional to the willingness for a computer program to analyse spending habits and recommend improvements. This relationship was also found to be the strongest in the case of the United Kingdom and the USA. H2 and H3 were confirmed.

The results of correlation analyses indicated that in most countries age was associated with less acceptance for a computer program to make investment decisions. The strongest relationship in this regard was found in the United Kingdom, followed by the USA and Australia. For all analysed countries, correlation analyses showed that as age increased, acceptance for a computer to analyse expenses and recommend improvements fell. The strongest correlations in this respect were also demonstrated for the United Kingdom, followed by Australia, with Turkey having the weakest. H4 was confirmed to be accurate.

The results of the Mann-Whitney U tests proved to be significant, which means the countries analysed featured differences between men and women in terms of their acceptance of robo-advice for investment. Such gender differences were not demonstrated in the case of Poland, the Czech Republic, Romania, Spain and Turkey. In all the remaining countries, men were more willing than women for a computer to make investment decisions on their behalf, with Germany and Austria having the largest gender divide. The results of the Mann-Whitney U tests were mostly irrelevant, which means that there were no differences between men and women in the analysed countries in terms of their acceptance of robo-advice for analysing expenses and recommending improvements. Such differences were only shown to apply to Germany, the Netherlands and Turkey. In the case of Germany and the Netherlands, men were more likely to have a computer analyse their expenses, while in the case of Turkey, women were more likely to do so. H5 was confirmed to be accurate.

The results of the Mann-Whitney U tests proved to be significant for the most part, meaning that the countries analysed featured differences between working and non-working people in terms of their acceptance of robo-advice for investment. Such differences were not found in the case of Poland, Austria, the Czech Republic, Luxembourg and Romania. In the remaining countries, it was demonstrated that working people were more favourably inclined towards robo-advice for investment while the largest differences were found in the United Kingdom. The results of the Mann-Whitney U tests in terms of robo-advice acceptance in the field of expenditure analysis again proved to be significant, which means that in the countries analysed there were differences between working and non-working people. Such differences were not revealed in the case of Poland, Austria, the Czech Republic and Romania. In the remaining countries, working people would be more likely to use robo-advice to

analyse spending and recommend improvement than non-working people. The greatest differences were also found in the United Kingdom. H6 was confirmed.

The research issues presented here are new, and the research results have practical significance and application value for entities offering automatic financial advice and household budget monitoring.

References

Anand, P. & Sternthal, B. (1990). Ease of message processing as a moderator of repetition effect in advertising, *Journal of Marketing Research*, 27(3), pp. 345-353. https://doi.org/10.2307/3172591

Baker, T. & Dellaert, B. (2017). Regulating Robo Advice Across the Financial Services Industry, University of Pennsylvania Carey Law School, Faculty Scholarship at Penn Law. 1740.

Beketov, M., Lehmann, K. & Wittke. (2018). M. Robo Advisors: quantitative methods inside the robots. *Journal of Asset Management*, 19, pp. 363-370. https://doi.org/10.1057/s41260-018-0092-9

Beckett, A., Hewer, P. & Howcroft B. (2000). An exposition of consumer behaviour in financial services industry. *International Journal of Bank Marketing*, 18/1, pp. 15-26. https://doi.org/10.1108/02652320010315325

Bhatia, A., Chandani, A., & Chhateja, J. (2019). Robo advisory and its potential in addressing the behavioral biases of investors – A qualitative study in Indian context. *Journal of Behavioral and Experimental Finance*, 25, 100281, pp. 1-9. https://doi.org/10.1016/j.jbef.2020.100281

Bhatnagar, H. (2016). Customer Satisfaction and Technology in banking – A Scenario of Udaipur City*, Arabian Journal of Business and Management Review,* 6(4), pp. 1-6. https://doi.org/10.4172/2223-5833.1000228

Belanche D., Casaló L.V., & Flavián C. (2018). Artificial Intelligence in fintech: understanding robo-advisors adoption among customers, *Industrial Management & Data System,* 119, pp. 1411-1430. https://doi.org/10.1108/IMDS-08-2018-0368

Belanche, D., Casaló, L.V., Flavián, C. & Guinalíu, M. (2019), Reciprocity and commitment in online travel communities, *Industrial Management & Data Systems*, 119(2), pp. 397-411. https://doi.org/10.1108/IMDS-03-2018-0098

Blackwell, R. D., Miniard, P. W. & Engle, J.F. (2005). Consumer behaviour. Cincinnati: South-Western College Publishing.

Boon-itt, S. (2015). Managing self-service technology services quality to enhance e-satisfaction, *International Journal of Quality and Service Sciences*, 7(4), pp. 373-392. https://doi.org/10.1108/IJQSS-01-2015-0013

Brian, J. Taillon, & Bruce, A. Huhmann. (2017). Strategic consequences of self-service technology evaluations*, Journal of Strategic Marketing*, 27(3), pp. 268-279. https://doi.org/10.1080/0965254X.2017.1411387

Buettner R. (2017). Predicting user behaviour in electronic markets based on personality-mining in large online social network. A personality-based product recommender framework, *Electronic Markets*, CrossMark 27, pp. 247-264. https://doi.org/10.1007/s12525-016-0228-z

Collier, J. E. & Kimes, S.E. (2012). Only If It Is Convenient: Understanding How Convenines Influences Self-Services Technology Evaluation, *Journal of Services Research,* 16(1), pp. 39-51. https://doi.org/10.1177/1094670512458454

Collier J. E. & Barnes D.C. (2015). Self-services delight: Exploring the hedonic aspects of self-services, *Journal of Business Research*, 68, pp. 986-993. https://doi.org/10.1016/j.jbusres.2014.09.036

D'Acunto, F., Prabhala, N. & Rossi, A. G. (2019). The Promises and Pitfalls of Robo-Advising, *The Review of Financial Studies,* 32(5), pp. 1983- 2020. https://doi.org/10.1093/rfs/hhz014

Das, K.K. & Ali, S. (2020). The role of digital technologies on grown of mutual funds industry: An impact study, *Research in Business & Social Science*, 9(2), pp. 171-176. https://doi.org/10.20525/ijrbs.v9i2.635

Djelassi, S., Diallo, M.F. & Zielke, S. (2018). How self-service technology experience evaluation affect waiting time and customer satisfaction? A moderated mediation model, *Decision Support Systems,* Elsevier, 111, pp. 38-47. https://doi.org/10.1016/j.dss.2018.04.004

EIBIS. (2020). Who is prepared for the new digital age? Evidence from the EIB Investment Survey. Retrieved from https://www.eib.org/en/publications/who-is-prepared-for-the-new-digital-age

Erikkson K., & Nilsson D. (2007). Determinants of the continued use of self-service technology: The case of Internet banking, *Technovation*, 27(4), pp. 159-167. https://doi.org/10.1016/j.technovation.2006.11.001

Gai, K. Qiu, M. & Sun, X. (2018). A survey on fintech, *Journal of Network and Computer Applications*, 103, pp. 262-273. https://doi.org/10.1016/j.jnca.2017.10.011

Gelderman, C.J., Ghijsen, P.W.Th., & Diemen, R. (2011). Choosing self-service technologies or interpersonal services—The impact of situational factors and technology-related attitudes, *Journal of Retailing and Consumer Services*, 18(5), pp. 414-421. https://doi.org/10.1016/j.jretconser.2011.06.003

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Glaser, F., Iliewa, Z., Jung, D. & Weber, M. (2019), Towards designing robo-advisors for unexperienced investors with experience sampling of time-series data, in Davis, F., Riedl, R., vom Brocke, J., Léger, P.M. and Randolph, A. (Eds), *Information Systems and Neuroscience. Lecture Notes in Information Systems and Organisation*, Vol. 29, Springer, Cham, pp. 133-138.

Hung, C.S., Yen, D.C., Ouc, C.S. (2012). An empirical study of the relationship between a self-service technology investment and firm financial performance, *Journal of Engineering and Technology Management*, 29(1), pp. 62-70. https://doi.org/10.1016/j.jengtecman.2011.09.006

Iriobe, G. & Oyinlola. (2017). The Effect of Financial Technology Services on Banks Customers Satisfaction in Nigeria, *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2984215

Iberahim, H., Mohd Taufik, N.K., Mohd Adzmir, A.S. & Saharuddin, H. (2016). Customer Satisfaction on Reliability and Responsiveness of Self Service Technology for Retail Banking Services, *Procedia Economics and Finance*, Elsevier, 37, pp. 13-20. https://doi.org/10.1016/S2212-5671(16)30086-7

ING International Survey – New Technologies (2019).

Jagtiani, J. & Kose, J. (2018). Fintech: The Impact on consumers and regulatory responses. *Journal of Economics and Business*. 100. https://doi.org/10.1016/j.jeconbus.2018.11.002

Ji, M. (2017), Are robots good fiduciaries? Regulating robo-advisors under the investment advisers act of 1940, *Columbia Law Review*, 117(6), pp. 1543-1583. https://doi.org/10.2139/ssrn.3036722

Jung, D., Dorner, V., Glaser, F. & Morana, S. (2018). Robo-Advisory - Digitalization and Automation of Financial Advisory, *Business & Information Systems Engineering*, 1(60). https://doi.org/10.1007/s12599-018-0521-9

Kim, S. & Lim, Y.J. (2010). Consumers' Perceived Importance of and Satisfaction with Internet Shopping, *Electronic Markets*, 11, pp. 148-154. https://doi.org/10.1080/101967801681007988

Liljander, V., Gillberg, F., Gummerus, J. & van Rie,l A. (2006). Technology readiness and the evaluation and adoption of self-service technologies, *Journal of Retailing and Consumer Services 13*, Elsevier, pp. 177-191. https://doi.org/10.1016/j.jretconser.2005.08.004

Lundahl, N., Vegholm, F. & Silver, L. (2009). Technical and functional determinants of customer satisfaction in the bank-SME relationship. *Managing Service Quality,* 19(5), pp. 581-594. https://doi.org/10.1108/09604520910984382

Marinova, D., de Ruyter, K., Huang, M.H., Meuter, M.L. & Challaballa, G. (2017). Getting smart: learning from technology empowered frontline interactions, *Journal of Service Research*, 20(1), pp. 29-42. https://doi.org/10.1177/1094670516679273

Mazurek, K. & Maz, K. (2019). Human vs. Artificial Intelligence – A consumer behavioral study on advice taking among Gen Y. Master Thesis submitted to the Barcelona School of Management in Partial Fulfillment of the Requirements for the Degree of Masters of Science in Management at Universitat Pompeu Fabra. https://doi.org/10.13140/RG.2.2.11214.20807

Mordor Intelligence. (2017). Global Fintech Market (2017-2024). Retrieved from https://research.mordorintelligence.com/reports/global-fintech-market

Netscribes. (2018). Global Robo-advisory Market (2018-2023). Retrieved from https://www.slideshare.net/researchonglobalmarketsrogm/global-roboadvisory-market-20182023

Nitin B., Abhilas D., Aishwarya D., Lipsa D., Siddharth M., Supriyo G. (2019). Robo-Advisory: An Intestor's Perception. *International Journal of Psychosocial Rehabilitation*, 23(3), pp.1-11. https://doi.org/10.37200/IJPR/V23I3/PR190376

Palmiéa, M., Wincenta, J., Paridace, V., Caglard, U. (2020). The evolution of the financial technology ecosystem: An introduction and agenda for future research on disruptive innovations in ecosystems, *Technological Forecasting and Social Change*, 151, 119779. https://doi.org/10.1016/j.techfore.2019.119779

Parasuraman, A. (2000), Technology readiness index (Tri): a multiple-item scale to measure readiness to embrace new technologies, *Journal of Service Research*, 2(4), pp. 307-320. https://doi.org/10.1177/109467050024001

Rosman, C. (2018), Mad about Erica: why a million people use bank of America's chatbot, *American Banker*, New York, NY, available at: www.americanbanker.com/news/mad-about-erica-why-a-million-people-use-bank-of-americas-chatbot

Sabri, M.F.F. (2011). Pathways to financial success: Determinants of financial literacy and financial well-being among young adults. Iowa State University: Graduate Theses and Dissertations. 11205, pp. 54-84. http://lib.dr.iastate.edu/etd/11205

Shanmuganathan, M. (2020). Behavioural finance in an era of artificial intelligence: Longitudinal case study of robo-advisors in investment decisions, *Journal of Behavioral and Experimental Finance*, 100297. https://doi.org/10.1016/j.jbef.2020.100297

Sheth, J. N., Newman, B. I., & Gross, B. L. (1991). Why we buy what we buy: A theory of consumption values. *Journal of Business Research*, 22(2), pp. 159–170. https://doi.org/10.1016/0148-2963(91)90050-8

Skinner, Ch. (2018). Digital Human: The fourth revolution of humanity Includes Everyone. Marshal Cavendish International: Wiley.

Statista.com. (2019). Robo-advisors worldwide report. Retrieved from: www.statista.com/outlook/337/100/robo-advisors/worldwide

Schueffel, P. (2016). Taming the Beast: A Scientific Definition of Fintech, *Journal of Innovation Management*, JIM 4, 4, pp. 32-54. https://doi.org/10.2139/ssrn.3097312

Świecka, B., Yeşildağ, E., Özen, E. & Grima, S. (2020). Financial literacy: the case of Poland. *Sustainability,* 12(2), 700. https://doi.org/10.3390/su12020700

Tanda, A. & Schena, C.M. (2019). fintech, BigTech and Banks. Digitalisation and its impact on banking business models. Palgrave Macmillan. https://doi.org/10.1007/978-3-030-22426-4

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Thorun C. & Diels J. (2020). Consumer protection technologies: an investigation into the potentials of new digital technologies for consumer policy. *Journal of Consumer Policy,* 2020/43. https://doi.org/10.1007/s10603-019-09411-6

Zopounidis C., Doumpos M., Niklis D. (2018). Financial decision support: an overview of development and recent trends. *EURO J Decis Process,* 6, CrossMark. Springer, pp. 63-76. https://doi.org/10.1007/s40070-018-0078-3

Xie M. (2019). Development of Artificial Intelligence and Effects on Financial System, *Journal of Physics. Conference Series* 1187, 032084, pp. 1-7. https://doi.org/10.1088/1742-6596/1187/3/03208

Zhu Z., Nakata C., Sivakumar K. & Grewal D. (2007). Self-services technology effectiveness: The role of design features and individual traits, *Journal of the Academy of Marketing Science*, 35(4), pp. 492-506. https://doi.org/10.1007/s11747-007-0019-3

Krzysztof WALISZEWSKI is Associate Professor in Poznań University of Economics and Business, Poland, at the Institute of Finance. His research focuses on the personal financial planning and management, financial intermediation, personal financial advice, fin-tech and robo-advice.
ORCID ID: 0000-0003-4239-5875

Anna WARCHLEWSKA is Assistant Professor in Poznań University of Economics and Business, Poland, at the Institute of Finance. Her research focuses on personal financial management, modern applications of mobile banking - PFM, financial education, financial exclusion.
ORCID ID: 000-0003-0142-7877

INVESTMENT CLIMATE AND ITS INFLUENCE ON THE DEVELOPMENT OF ENTREPRENEURSHIP: PRACTICE OF THE REPUBLIC OF KAZAKHSTAN

Arslan Kulanov [1], Saltanat Tamenova [2], Kamilya Amenova [3], Alma Karshalova [4], Leila Tussupova [5]

[1,2,5] *Turan University, Satpaeva Street, 16a, Almaty, 050000, Kazakhstan*
[3,4] *Narxoz University, Zhandosova Street, 55, Almaty, 050035, Kazakhstan*

Abstract. The purpose of this study is to identify problems that impede the investment activities of small and medium-sized enterprises (SMEs) in the Republic of Kazakhstan, as well as to study the recommendations of the leading representatives in the business community regarding the activities of the authorities in creating a favorable investment climate. Expert interviews with the Kazakhstan's entrepreneurs, representatives of Akimats, and representatives of the scientific community have been conducted during the study. The results of the expert survey allow to conclude that the Republic of Kazakhstan has developed a rather favorable investment climate in general, and the authorities have done significant work to create conditions for business development. However, according to the expert review, some problems in the implementation of investment projects by SMEs still remain. According to the experts, the most significant problems include the underdeveloped transport and logistics infrastructure, the lack of available production and office space, and difficulties with registering land, attracting foreign labor, as well as obtaining various permits required for doing business. As a result of the study, the recommendations have been made for eliminating the barriers that hinder the creation of a favorable investment climate and the successful development of SMEs in the Republic of Kazakhstan. According to the experts, the attention should be focused on creating and developing ready-made platforms for doing business for investors, improving transport and logistics infrastructure, speeding up the state property privatization, etc.

Keywords: investment climate; business environment; entrepreneurship; business climate; investment activities

1. Introduction

Integration with global markets and the increasing competitiveness of the private sector have contributed to the unprecedented growth of many economies – especially those of Asian countries, such as China, Vietnam, etc. (World bank, n.d.; Siddique et al., 2020; Adeniran et al., 2020).

The development of entrepreneurship in the Republic of Kazakhstan is the most important factor in influencing the welfare of the country's economy (Serikbaeva, Bektanov, Bekturganova, 2019). More than 1.2 mln SMEs operated in the country and over 3.3 mln people were employed in the sector at the beginning of 2019 (Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan, n.d.).

At the same time, the economic potential of SMEs in the Republic of Kazakhstan is not fully utilized. The number of people currently employed in SMEs in the Republic of Kazakhstan is 21.6 %. In most advanced economies, this indicator is in the range of 45 – 75 %. For example, the number of people employed in SMEs is 44.9 % of the total employment in Germany, 50 % - in France, 56.1 % - in the UK, 73.3 % - in Italy, and 72.9 % - in Korea (OECD.stat, n.d.).

The SMEs' contribution of the value added to the GDP in the Republic of Kazakhstan is 28.4 % (Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan, n.d.). For comparison, this indicator is 76.6 % in Korea, 63.4 % - in Italy, 45.6% - in the UK, and 43.4 % - in France (OECD.stat, n.d.).

Foreign direct investment (FDI) is one of the main catalysts for the development and encouragement of the economic activities of SMEs. It is generally recognized that the importance of FDI for the country's economic prospects is growing amid the increasingly globalized business environment. Attracting investment in economic development is especially important for the Republic of Kazakhstan, which has positive prospects for the growth of consumer markets and unrealized natural resource potential.

For the Kazakhstan's SMEs, the potential benefits of attracting investments are related to expanding market opportunities and internationalizing their business, improving managerial skills, using new technologies, and facilitating access to capital (Dyussembekova et al., 2019).

The Republic of Kazakhstan observes the positive dynamics in the development of investments: the inflow of FDI in the country's economy increased by almost 58 % over four years, from 15.4 bln USD in 2014 to 24.3 bln USD in 2018 (Statistics of direct investment by the direction of investments, n.d.).

A favorable investment climate is one of the main reasons for the observed growth in investment activities in the Republic of Kazakhstan. While huge reserves of Kazakhstan's hydrocarbons and mineral resources remain the basis of the economy, the government of the Republic of Kazakhstan creates the proper conditions: the investment law is enforced, the relevant regulations are adopted, preferences for certain types of production are put in effect, the money is raised to invest in free economic zones (FEZs), and an appropriate program of industrial and innovation-driven growth is adopted.

Kazakhstan adopted the OECD Declaration and Decisions on International Investment and Multinational Enterprises and became an associate member of the OECD Investment Committee in June 2017 (Madiyev et al., 2018).

In August, 2017 the government of Kazakhstan adopted a new National Investment Strategy for 2018 – 2022, developed together with the World Bank, which outlined new coordination measures to improve the investment climate, privatization plans, and a policy of economic diversification. The strategy aims to increase the total FDI inflow by 25 % by 2022 (Decree of the Government of the Republic of Kazakhstan No. 498, 2017).

The efforts of Kazakhstan to remove bureaucratic barriers, in particular through a "single-window" program for investors, were moderately successful, and Kazakhstan ranked 28th out of 190 in the World Bank's ranking on the ease of doing business in 2019 (World Bank, 2020).

Despite ongoing institutional and legal reforms, such problems as corruption, bureaucracy, and limited access to skilled labor remain relevant in some regions of Kazakhstan.

2. Literature review

Many scientific works are devoted to the problems of the SMEs development. Many authors agree that entrepreneurship is a powerful economic force that creates the majority of new jobs and contributes to economic growth, which determines the interest of the state in this phenomenon (Burov, 2013; Dethier, Hirn, Straub, 2011; Aterido, Hallward-Driemeier, Pages, 2007; Dollar, Hallward-Driemeier, Mengistae, 2005; Merzlova, Sharkova, 2013; Rubio-Mozos, García-Muiña, Fuentes-Moraleda, 2019; Kowo, Adenuga, Sabitu, 2019).

The steady growth of SMEs reflects the stability of the economy (Rubio-Mozos, García-Muiña, Fuentes-Moraleda, 2019). Although the concept of entrepreneurship has not been yet completely formed, the interest of researchers in it is growing (Wiklund et al., 2011).

Researchers note that creating a favorable environment for the dynamic development of the entrepreneurship sector is directly dependent on government policies aimed at creating a transparent, stable, and predictable investment climate (Dethier, Hirn, Straub, 2011; Novolodskaya et al., 2019; Savitz, Dan Gavriletea, 2019).

The investment climate is the economic, financial, and sociopolitical conditions in the country that influence the willingness of individuals, banks, and institutions to issue loans and to acquire shares (to invest) in the enterprises operating in that country (Ongbwa, 2017).

The investment climate in a given country or region can be defined by a wide range of factors that determine whether domestic and foreign investments occur: the soundness of macroeconomic policies, the strength of economic and political institutions, the regulatory framework, the quality of infrastructure and other services, etc. (Vijayalakshmi et al., 2019).

As a rule, factors contributing to the development of the investment climate are selected during surveys of company managers and owners, as well as during interviewing potential investors.

Much of the research literature is devoted to the study of the relationship between the characteristics of the business regulatory environment and enterprise performance, as well as macroeconomic results (Rose, Mamabolo, 2019; Lynch-Wood, Williamson, 2014; Asim et al., 2019; Avan, Kraslawski, Huiskonen, 2017). However, the studies in general do not give final results regarding the direction of causal relationships. A hypothesis is usually made that better regulation encourages better economic outcomes (Graafland, Bovenberg, 2019).

Many aspects influence the quality of the country's investment climate and overall competitiveness. A number of global benchmarking initiatives have been developed by now, which can be useful in understanding the investment climate of business in countries (Borkova et al., 2019).

Most of these initiatives are built around five topics (Golaido, Soboleva, 2015): 1) competitiveness and investment climate; 2) prospective restrictions on the part of enterprises; 3) business and investment barriers; 4) risk and uncertainty of the policy; and 5) the cost of operations.

With regard to competitiveness and investment climate, the data on prospective restrictions on entrepreneurship are provided in the World Bank Group's enterprise surveys. The World Bank Group's Doing Business indicators measure regulatory concerns for enterprises based on a combination of statistics, regulatory information, and enterprise surveys (World Bank, 2020). These surveys and indicators are complementary, but have different approaches to benchmarking of the business environment quality in different countries.

The World Economic Forum's Global Competitiveness Index (World Economic Forum, 2019) is another source of information, which combines the results of opinion polls of managers and quantitative data in an attempt to measure the economy competitiveness based on a set of elements covering broad socioeconomic aspects, such as institutions, infrastructure, macroeconomic stability, financial system, dynamism of entrepreneurial activities, innovative potential, etc.

The United Nations Industrial Development Organization (UNIDO, 2018) evaluates more than 100 countries in terms of their industrial competitiveness and their production and export potential, in particular.

The policies of the Organization for Economic Cooperation and Development (OECD) address a range of areas that influence investment. The OECD uses such indicators as the volume of external flows and inflow of FDI, external and internal positions of FDI, as well as income from the export and inflow of FDI in order to assess the investment climate. The index of regulatory restrictions on FDI is one of the most important indicators that determine the factor of the country's attractiveness for foreign investment (Kalinova, Palerm, Thomsen, 2010).

As such, a rather extensive methodological base for assessing the state of the investment climate is presented in the scientific literature at the moment. However, the leading global indicators of various aspects of the investment climate are not sufficient to get a complete picture of the problems of investment competitiveness of small and medium enterprises in countries with developing economies.

The hypothesis of the study is the assumption that a favorable investment climate helps raise capital and increase the competitiveness of SMEs.

3. Methods

The main method of research was a representative sociological survey of experts. The experts were selected according to a preplanned list sample. Three hundred and eleven people were invited as experts from among the heads and deputy heads of SMEs in the Republic of Kazakhstan, 32 representatives of Akimats with the economic profile, and 27 representatives of the scientific community competent in the subject of the study. If an expert did not want or could not participate in the interview, then other people competent in the subject of the study, i.e., their deputies, assistants, and colleagues, were allowed to participate in the survey.

The main objectives of the survey were to obtain data describing the state of the investment climate, including problems and prospects for the development of SMEs, and to prepare recommendations for improving the investment climate in the Republic of Kazakhstan.

The survey was conducted using the approved questionnaire with formalized questions. A personal interview with an expert was used as the interview method. If a personal interview with the expert was impossible, the survey was carried out by phone or by email. The interview was recorded using a voice recorder (after that, the audio was transcribed into Word).

Based on the results of the survey, a general list of factors that have both positive and negative impact on the investment climate of the country has been compiled. By the nature of the impact on the innovation climate, all factors are divided into several groups:

• Factors of the country's natural resource potential - mineral reserves, availability of own fuel and energy resources, level of environmental pollution;

• Factors of the institutional environment and socio-political stability - the level of the regulatory framework for the protection of property rights and regulation of small and medium-sized businesses, the development of competition mechanisms and market institutions, the tax environment, government support measures for small and medium-sized enterprises, measures to ensure the execution of contracts;

• Infrastructural factors - the quality of financial infrastructure, transport accessibility, the state of energy infrastructure, the level of ICT development, the provision of housing for the population;

• Factors of economic development - macroeconomic stability of the country, GDP per capita, inflation, openness of the economy to international trade, annual growth in value added of industrial sectors, gross capital formation, final consumption expenditures.

• Labor market development factors - unemployment rate, labor productivity in industry, agriculture, services sector.

The distribution of the survey participants by the beginning of their activities was uniform: 18 % carried out their activities for no more than three years, every fifth entrepreneur began to carry out their activities no earlier than one year ago – 22 %, or six months ago – 22 %. Only 18 % of the entrepreneurs had been working for more than three years.

4. Results

The results of the survey reveal that most experts positively assess the measures of the authorities of the Republic of Kazakhstan aimed at the development of SMEs. For more convenient presentation, the experts' responses were divided into three groups: high ratings (positive), average ratings (neutral), and low ratings (negative).

Translating into a five-point rating scale, most entrepreneurs usually give these measures four points. At the same time, all representatives of government bodies that took part in the survey rated the existing support measures as high (Figure 1).
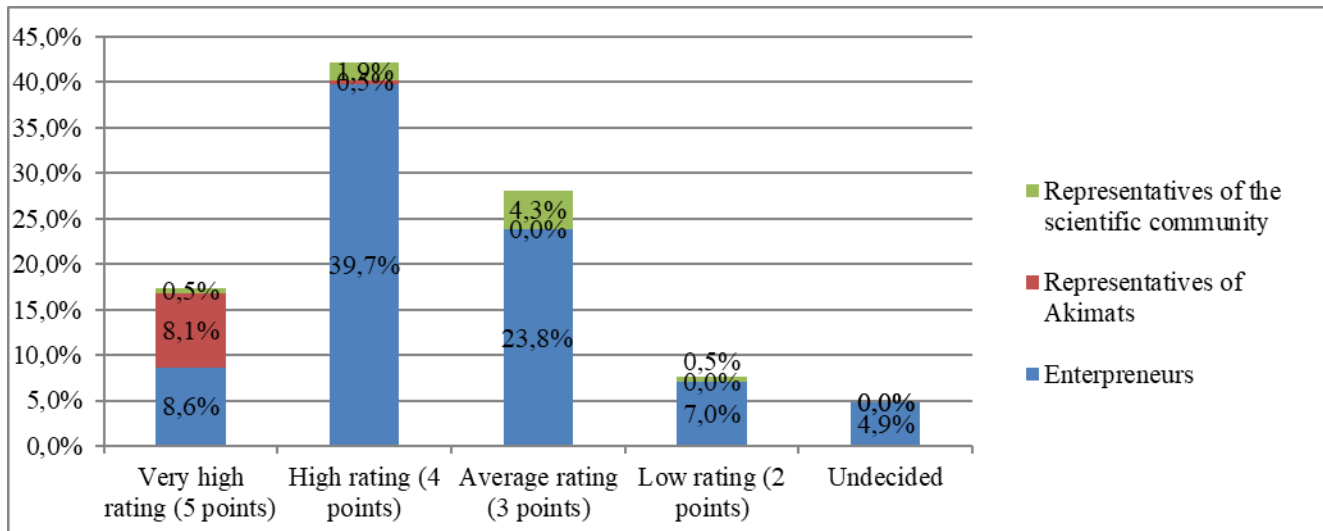
Fig. 1. Assessment of the measures of local authorities aimed at the development of entrepreneurship, % of the respondents
Source: Compiled by Authors

At the same time, it can be noted that there is a high proportion of the experts in the overall distribution who assess the measures of government bodies aimed at developing SMEs in the Republic of Kazakhstan at an average level, noting that the shortcomings are still present (28.1 % of the respondents), and who rate these measures as low (7.6 %). In addition, 18 experts from among entrepreneurs indicated that they found it difficult to assess these measures because they had never noticed or encountered them. The respondents consider these measures to be insufficient because the authorities do not always want to "hear" entrepreneurs and are not always open.

The experts assess the measures aimed at creating a favorable investment climate in the Republic of Kazakhstan as lower than the measures to develop entrepreneurship in the country.

The share of the experts who took part in the survey and found it difficult to assess these measures, since they had never encountered or heard anything about them, was almost 15 % (Figure 2).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
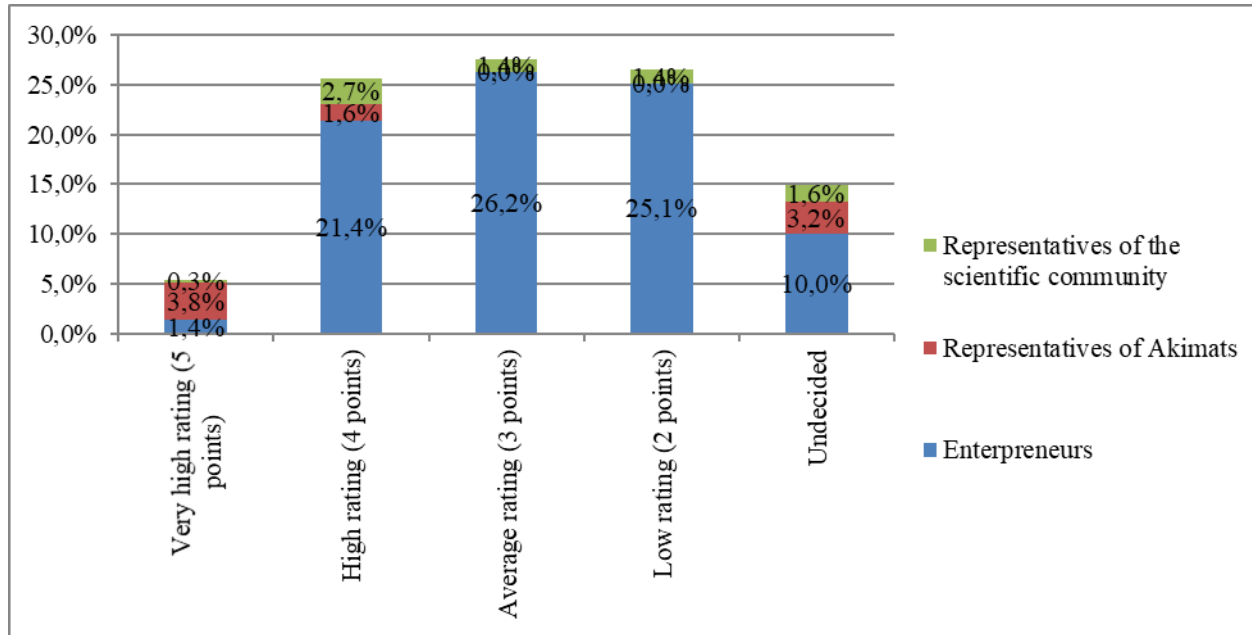

Fig. 2. Assessment of the measures aimed at creating a favorable investment climate in the Republic of Kazakhstan
Source: Compiled by Authors

At the same time, 31.1 % of the business, government, and the scientific community representatives in the Republic of Kazakhstan highly rate the measures aimed at creating an investment climate.

At the same time, the shares of the experts who rated the measures to create an investment climate in Kazakhstan at an average and low level were approximately equal. For example, 27.6 % of the experts highly appreciate the measures aimed at creating an investment climate. At the same time, 26.5 % of the experts, on the contrary, rate these measures very low. Most experts (84.3 %) believe that Kazakhstan is already an attractive and promising field for raising investment. The level of satisfaction with the business conditions existing today in the Republic of Kazakhstan among the experts is rather at the average level (Figure 3).
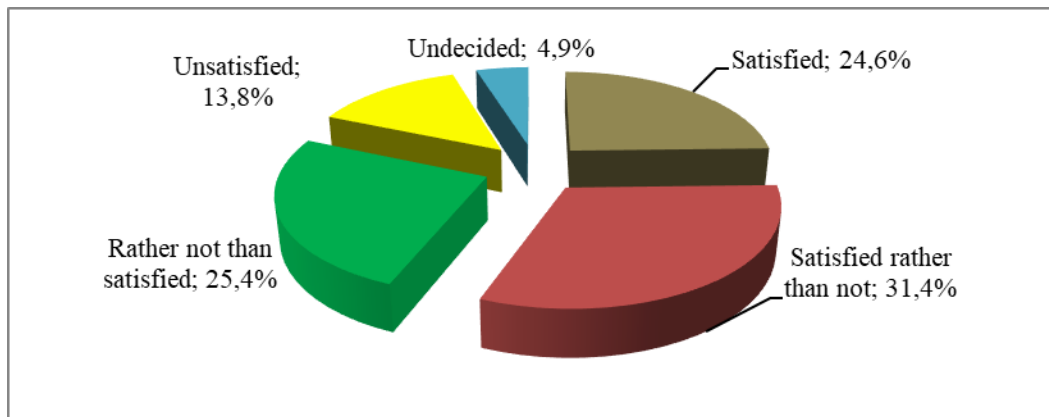
Fig. 3. The level of satisfaction of SMEs' representatives with the business environment in Kazakhstan
Source: Compiled by Authors

427

The survey results indicated that entrepreneurs were generally not critical in assessing the conditions for doing business, but they did not provide high ratings either, noting that there were still some problems in this area. At the same time, almost 5 % of the business representatives found it difficult to answer this question.

The experts note that despite the fact that much work has been done in the Republic of Kazakhstan in terms of the measures aimed at developing SMEs in general, there are big problems with the implementation of investment projects of SMEs. According to the experts, the largest share of serious problems in the implementation of investment projects is noted in infrastructure and logistics (51.1 %) and the lack of available production and office space (48.9 %) (Figure 4).
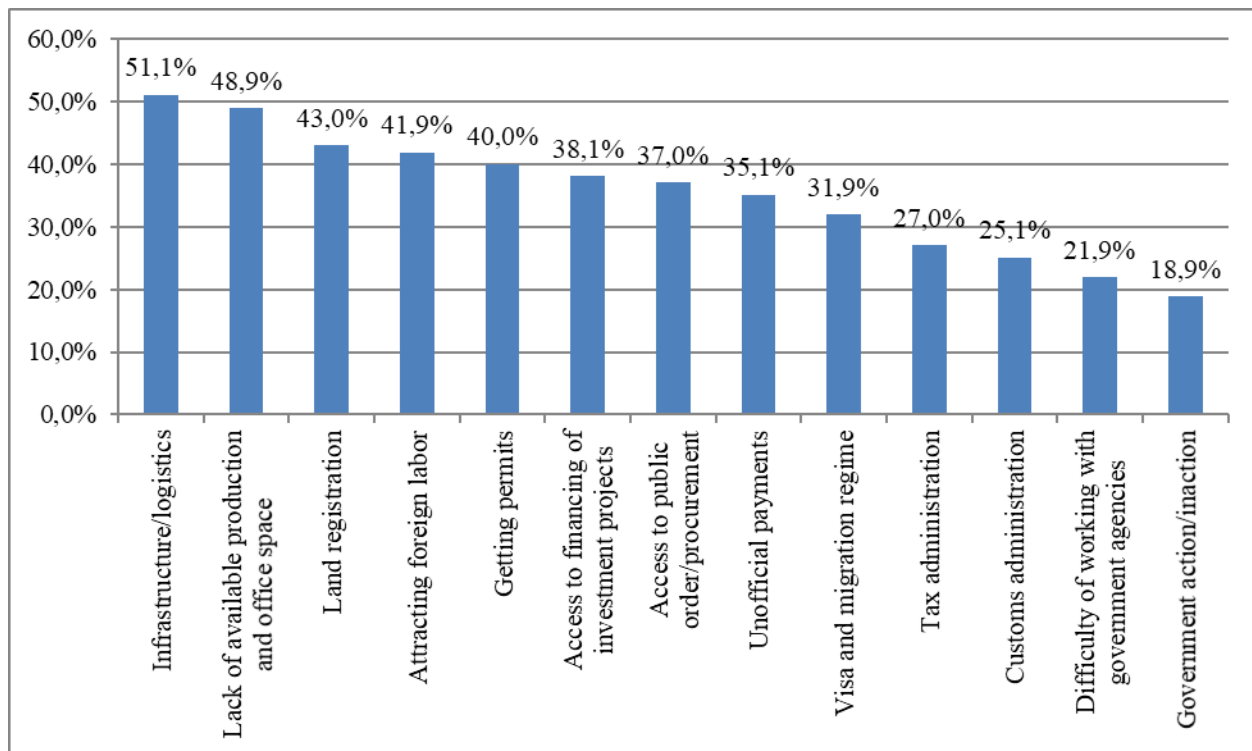
Fig. 4. Problems of SMEs that arise when implementing investment projects
Source: Compiled by Authors

In the course of the survey, the experts were invited to identify factors that encouraged the investment activities of SMEs. The experts noted the availability of significant reserves of fossil fuels and other minerals and metals, the laws in force in the Republic of Kazakhstan on the protection of property rights, a fairly favorable tax environment, and a range of government support measures for SMEs as the main encouraging factors that influenced the investment climate (Figure 5).
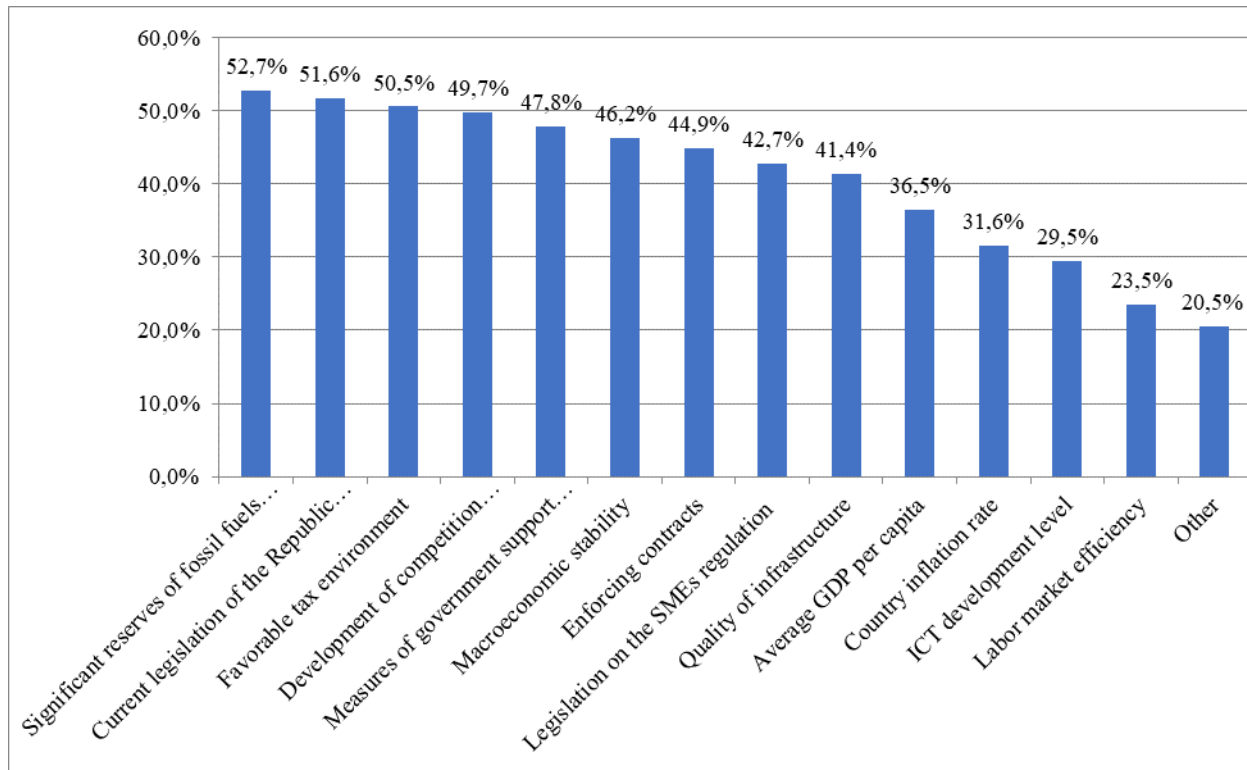
Fig. 5. Factors that encourage the investment climate development
Source: Compiled by Authors

More than 40 % of the respondents named the development of competition mechanisms and market institutions, macroeconomic stability, established rules for enforcing contracts, legislation on the SMEs regulation, and the quality of infrastructure as the main encouraging factors.

In general, the experts believe that these factors should ensure and encourage the development of SMEs and the stability of the investment climate. It must be noted that the experts who took part in the survey mentioned that the factors influencing the state of the investment climate and the development of SMEs were interconnected and usually did not differ.

5. Discussion

In conclusion, the experts were asked to give their recommendations for the creation of a favorable investment climate and the successful development of SMEs in the Republic of Kazakhstan.

The most popular recommendations on the creation of a favorable investment climate and the successful development of SMEs in the Republic of Kazakhstan mentioned by the experts include the creation and development of ready-made platforms for doing business for investors, improvement of infrastructure, speeding up the privatization process, etc. (Figure 6).
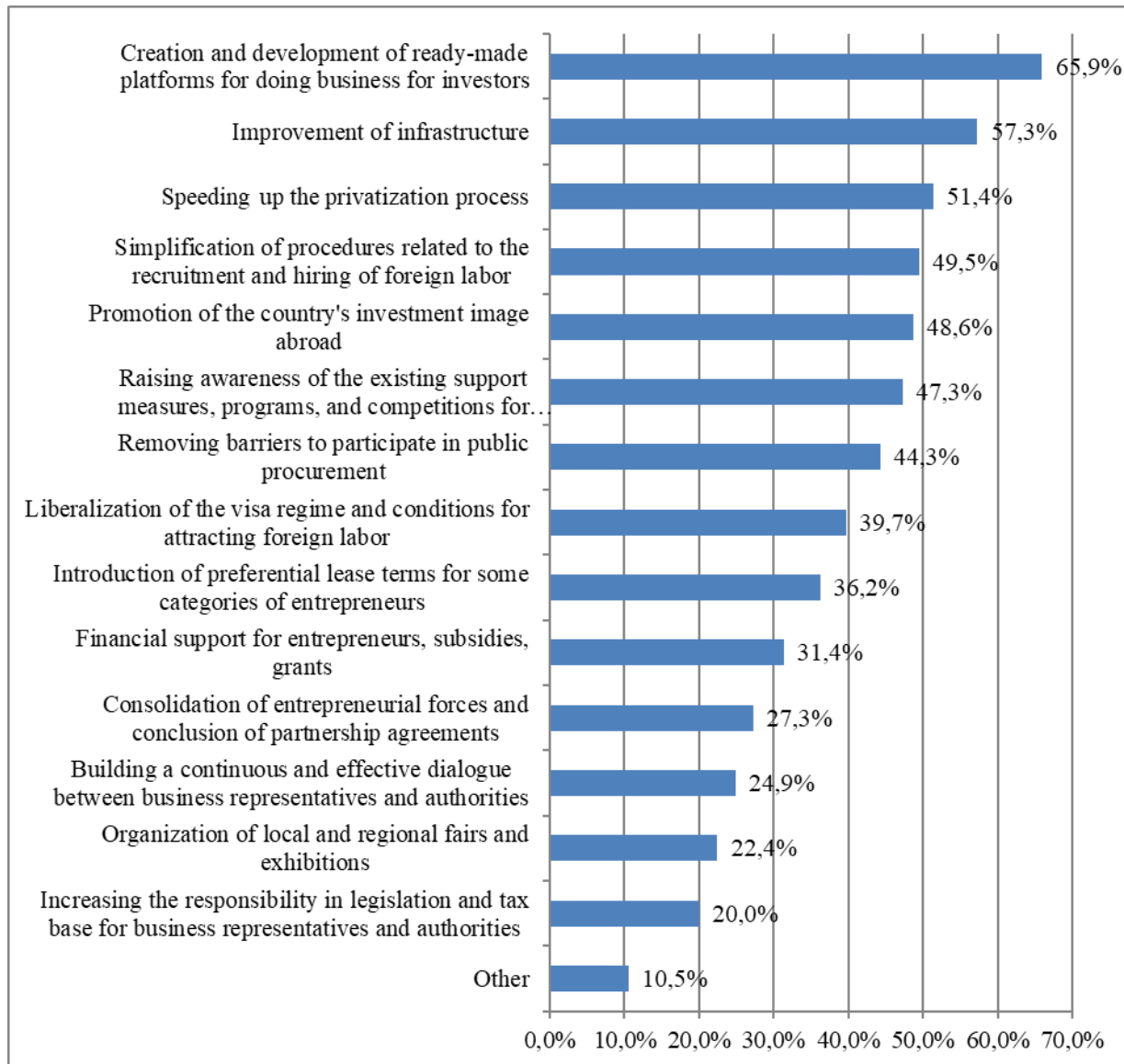
Fig. 6. Recommendations on the creation of a favorable investment climate and the successful development of SMEs
Source: Compiled by Authors

Almost two-thirds of the experts (65.9 %) believe that providing investors with ready-made platforms for doing business is an effective tool to attract investments in the country's economy. Such platforms include special economic and industrial zones (SEZ and IZ) and investment contracts.

It must be noted that 12 SEZs have already been created and are operating in the Republic of Kazakhstan. They have already proved their effectiveness. According to the Ministry of Industry and Infrastructure Development of the Republic of Kazakhstan, the budgetary costs for the construction of the infrastructure of all SEZs amounted to 314.3 bln tenge, while the volume of the raised investment amounted to approximately 910 bln tenge. This means that one tenge from the budget invested in the SEZ infrastructure allowed to raise 2.8 tenge of private

investments. At the same time, 85.9 bln tenge were invested in the IZ infrastructure. As such, 2.1 tenge of investments were attracted per each tenge invested from the budget. In total, 183 projects were launched in the territories of SEZs, of which 46 projects were with foreign participation, 15.5 thousand jobs were created, and about 150 bln tenge were repaid to the budget as taxes.

At the same time, 38.9 % of the experts noted that the SEZs in the Republic of Kazakhstan were not working efficiently enough, despite the significant level of budget investments in the development of zonal facilities. This requires timely diagnosis of the factors that impede the success of SEZs and targeted actions to address them.
The experts name the following main reasons for the low efficiency of some SEZs: weak management structures or too many institutions involved in the management of SEZs, poor location of facilities requiring large capital costs or situated far from the infrastructure centers; poor design of areas with inappropriate equipment or maintenance, etc. (Figure 7).
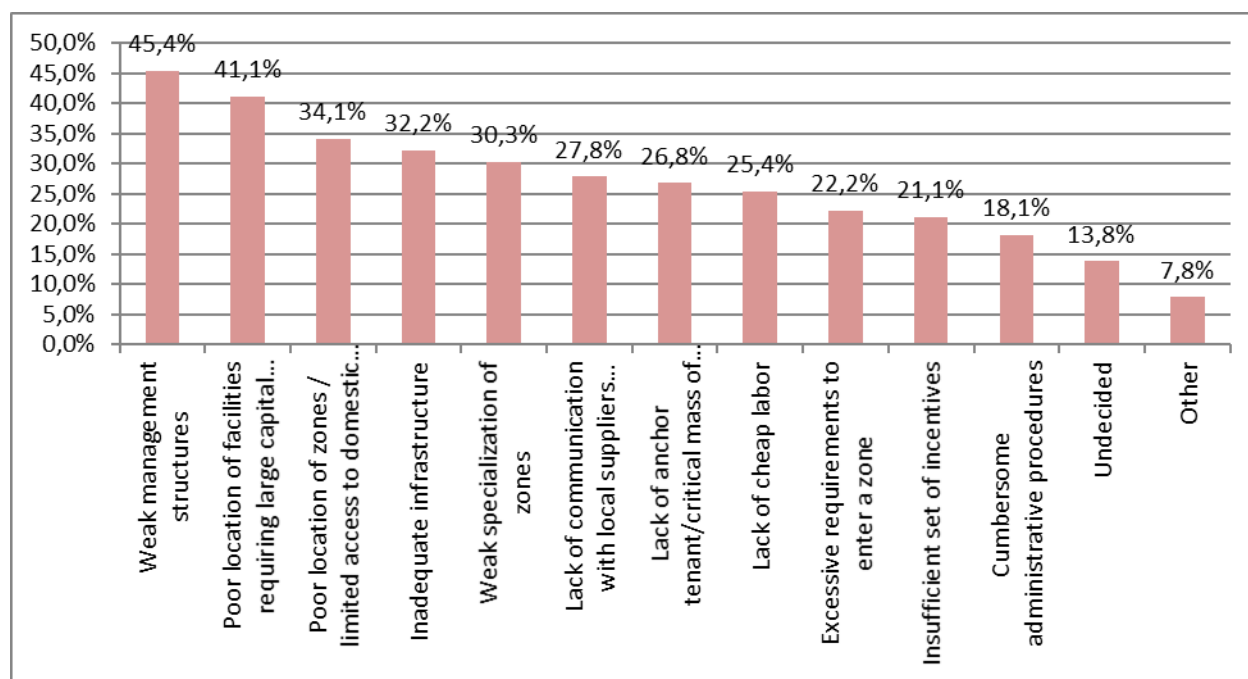

Fig. 7. Key problems for SEZs (% of the respondents)
Source: Compiled by Authors

Regular monitoring and evaluation mechanisms should become a key aspect of the institutional and managerial structure of the SEZ. There is no systematic evaluation of the performance of the zones in the Republic of Kazakhstan today, and no mechanisms have been created to solve the problems of insufficient performance of SEZs.

It seems appropriate to draw attention to international practice in the formation of a system for monitoring the performance of SEZs. For example, China regularly evaluates the performance of high-tech development zones (HTDZs), as well as economic and technological development zones (ETDZs). The 1996 Administrative Decree of the Ministry of Science and Technology requires regular evaluation of HTDZs. The 2013 rating index system includes four categories and 40 indicators, such as:

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

- Knowledge creation and technological innovation: the level of employees' education, R&D expenses, the number of research institutes and incubators, etc.

- Capabilities for industrial modernization and structural optimization: the number of high-tech enterprises, ratio of enterprises in the service sector, registration of intellectual property, the number of registered companies, etc.

- Internationalization and participation in global competition: the ratio of employees who have graduated abroad, the ratio of foreign personnel, the number of foreign branches, registration of intellectual property abroad, etc.

- Sustainable development potential: the ratio of employees with Master's and Doctor's degrees, growth rate of the number of companies or tax revenues, volume of new investments, energy consumption, etc.
Evaluation of the innovative potential of HTDZs has been used as an additional performance criterion since 2016.

The Ministry of Commerce of China has been conducting an annual ETDZ assessment since 2016. The exit system applies to the lowest rated ETDZs for two consecutive years. Evaluation of ETDZs is based on five criteria, namely industrial potential, technological innovation, regional integration, environmental protection, and administrative efficiency. The Ministry of Commerce publishes a list of top 30 zones and the names of top 10 zones in the categories of industrial potential, innovation, FDI, and foreign trade, respectively.

The Russian Federation has developed a comprehensive method for monitoring and evaluating the performance of its SEZs in a similar manner (Nikitina et al., 2018; Levkina, Sakharova, Edelev, 2020). The government monitors and evaluates several SEZ types in the Russian Federation: industrial production, technological innovation, tourism and recreation, and ports. The legislation of the Russian Federation establishes six indicators of the SEZ performance: investment attractiveness, business environment, infrastructural support, access to land resources, investment activity of the SEZ residents, and information transparency of the SEZ website. The evaluation is carried out annually, and zones are ranked according to certain criteria. This process mainly served to create equal pressure on the ineffective zones and regional authorities of the area in which they operate. Unscrupulous performers are excluded from the SEZ list and shut down.

In addition to the SEZs, the creation of SME parks is also a promising tool for creating a favorable investment climate in the Republic of Kazakhstan.

The SME parks are autonomous geographical areas with high-quality infrastructure facilities that host industrial enterprises. The main goal of the SME parks is to create SMEs that produce high value-added products but lack the necessary funds to invest in the development of their own basic infrastructure facilities, though they are able to pay for the services provided to them.

The government secures infrastructure facilities and, therefore, creates favorable conditions for attracting SMEs. The general goals of the SME parks are to take advantage of local and international investment opportunities by creating processing parks in strategic areas rich in raw materials.

In the course of the survey, the experts identified a number of priority areas for the development of the SME parks and industrial zones in the Republic of Kazakhstan: reimbursement of investor costs for building and assembly works on infrastructure construction (47.8 %), infrastructure construction by providing a preferential rate (30.3 %), and optimization and automation of land allocation (27.3 %).

More than half of the surveyed experts (52.2 %) highlighted the availability of high-quality infrastructure as a recommendation on creating a favorable investment climate and successful development of SMEs in the Republic of Kazakhstan. Almost all regions of Kazakhstan need additional investments in the logistics infrastructure. According to the ESCAP, the annual need for investments in the infrastructure of the Republic of Kazakhstan is 2.1 % of the GDP, of which 0.7 % of the GDP is for the transport infrastructure, 0.9 % is for the energy infrastructure, 0.3 % is for the water supply and sanitation infrastructure, and 0.2 % is for the ICT (Branchoux, Fang, Tateno, 2017). Improving infrastructure is especially important in the regions in order to attract foreign investors and FDI.

More than half of the experts (51.4 %) believe that the privatization process should be sped up in order to create a favorable investment climate. A large share of state participation strengthens monopolistic trends and limits the development and growth of enterprises and their market orientation.

The privatization process should be sped up to make the development of enterprises more efficient. To speed up the privatization process, an inventory of state property and assets should be compiled, and their market value should be determined with the involvement of an independent appraiser. One of the prerequisites for the privatization process is its transparency and openness. State property may be sold through an open electronic auction rather than through direct sales.

In addition to those mentioned above, the expert recommendations include the need to simplify procedures related to the attraction and hiring of foreign labor, promoting the country's investment image abroad, raising SMEs awareness of the existing measures of state support, removing barriers to the participation of SMEs in public procurement, etc.

Therefore, it is recommended for authorities and competent authorities to pay an increased attention to the measures proposed by the experts and consider the possibility of their implementation in the future.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Conclusions

The results obtained in the course of the study confirm the hypothesis that a favorable investment climate helps raise investment in the development of the country's economy and increase the investment activities of SMEs of the Republic of Kazakhstan.

According to the experts, the main problematic issues that arise during the investment activities of SMEs include the underdeveloped transport and logistics infrastructure, the lack of available production and office space, as well as difficulties with registering land.

In general, the experts have identified the following factors encouraging the investment activities of SMEs: availability of significant reserves of fossil fuels and other minerals and metals, the current legislation in the Republic of Kazakhstan on the protection of property rights, a rather favorable tax environment, and a range of the state support measures for SMEs.

The Kazakhstan's experts have made suggestions to improve the investment climate in the course of the survey. The most numerous expert recommendations relate to the creation and development of ready-made platforms for doing business for investors, improving transport and logistics infrastructure, and speeding up the privatization of state property.

References

Adeniran, A.O., Hamid, M.J., Noor, H.M. 2020. Impact of information technology on strategic management in the banking sector of Iraq, Insights into Regional Development 2(2): 592-601. https://doi.org/10.9770/IRD.2020.2.2(7)

Asim, S., Li, C., Makhdoom, H.U.R., Zafar, Z. 2019. Entrepreneurial technology opportunism and its impact on business sustainability with the moderation of government regulations, Entrepreneurial Business and Economics Review 7(3): 161 – 185. https://doi.org/10.15678/EBER.2019.070309

Aterido, R., Hallward-Driemeier, M., Pages, C. 2007. Investment climate and employment growth: the impact of access to Finance, corruption, and regulations between firms. Discussion Paper No. 3138, pp. 44. http://ftp.iza.org/dp3138.pdf

Avan, W., Kraslawski, A., Huiskonen, J. 2017. Understanding the relationship between stakeholder pressure and sustainability indicators in manufacturing firms in Pakistan, Procedure Manufacturing 11: 768 – 777.

Borkova, E.A., Barsukova, M.A., Plotnikov, V.A., Vatlina, L.V. 2019. Comparative analysis of tools for estimation of investment climate of territories, Humanities and Social Sciences Reviews 7(4): 1,336 – 1,346. https://doi.org/10.18510/hssr.2019.74186

Branchoux, C., Fang, L., Tateno, Yu. 2017. Estimating infrastructure financing needs in Asia-Pacific least developed countries, landlocked developing countries and small island developing States. MPFD Working Paper WP/17/02. Bangkok: ESCAP. Retrieved from: www.unescap.org/publications

Burov, V.Yu. 2013. Essence and content of modern small business: theoretical aspects, Bulletin of the Buryat state University 2: 31 – 34.

Decree of the Government of the Republic of Kazakhstan No. 498 dated August 22, 2017. On approval of the National Investment Strategy program for attracting investments and on introducing an amendment to the Decree of the Government of the Republic of Kazakhstan No.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

1136 dated December 30, 2015 "On approval of the list of government programs and invalidating some Decisions of the Government of the Republic of Kazakhstan." Collected Acts of the President and the Government of the Republic of Kazakhstan 2017, No. 34 – 35, Art. 249.

Dethier, J., Hirn, M., Straub, S. 2011. Explaining enterprise performance in developing countries with business climate survey data, World Bank Research Observer 26(2): 258 – 309. https://doi.org/10.1093/wbro/lkq007

Dollar, D., Hallward-Driemeier, M., Mengistae, T. 2005. Investment climate and performance of firms in developing countries, Economic development and cultural change 54(1): 1 – 31. http://dx.doi.org/10.1086/431262

Dyussembekova, G., Reshina, G., Primbetova, S., Sultanova, S., Beisembayeva, G. 2019. Role and Importance of the Damu Enterprise Development Fund and International Investment Funds in Implementing Project and Leasing Financing Programs in Kazakhstan. Space and Culture 6(5): 156 – 165.

Golaido, I.M., Soboleva, Yu.P. 2015. Assessment and management of regional investment potential factors, Asian Social Science 11(7): 240 – 251.

Graafland, J., Bovenberg, L. 2019. Government regulation, business leaders' motivations and environmental performance of SMEs, Journal of Environmental Planning and Management, pp. 1 – 21. https://doi.org/10.1080/09640568.2019.1663159

Kalinova, B., Palerm, A., Thomsen, S. 2010. OECD's FDI Restrictiveness Index: 2010 Update. OECD Working Papers on International Investment 2010/03. Retrieved from: https://www.oecd-ilibrary.org/finance-and-investment/oecd-s-fdi-restrictiveness-index_5km91p02zj7g-en

Kowo, S. A., Adenuga, O. A. O., Sabitu, O.O. 2019. The role of SMEs development on poverty alleviation in Nigeria, Insights into Regional Development 1(3): 214-226. https://doi.org/10.9770/ird.2019.1.3(3)

Levkina, E.V., Sakharova, L.A., Edelev, D.A. 2020. Comprehensive assessment of investment attractiveness of regions (based on the example of the regions of the Far East), Revista Inclusiones 7: 546 – 555.

Lynch-Wood, J., Williamson, D. 2014. Understanding SME responses to environmental regulation. Journal of Environmental Planning and Management 57(8): 1220 – 1239. https://doi.org/10.1080/09640568.2013.793174

Madiyev, G., Kerimova, U., Yespolov, A., Bekbossynova, A., Rakhimzhanova, G. 2018. Fostering Investment-Innovative Activity within the Agro-Industrial Complex of the Republic of Kazakhstan, Journal of Environmental Management and Tourism 9(3): 533 – 541.

Merzlova, M.P., Sharkova, A.V. 2013. Impact of investment climate on formation and increase of fixed capital of enterprises, Middle East Journal of Scientific Research 16(4): 486 – 489.

Nikitina, M.G., Pobirchenko, V.V., Shutaieva, E.A., Karlova, A.I. 2018. The investment component in a nation's economic security: the case of the Russian Federation, Entrepreneurship and Sustainability Issues 6(2): 958 – 967.

Novolodskaya, G.I., Chicherova E.Yu., Ponkratova, L.A., Gracheva, N.A., Ilkevich, S.V. 2019. Investing in Human Capital in Tourism Companies, Journal of Environmental Management and Tourism 10(2): 340 – 345.

OECD.stat. SDB structural enterprise statistics (ISIC Ed. 4): Employment of SMEs and large firms. Retrieved from: https://stats.oecd.org/index.aspx?queryid=69557#

Ongbwa, P.D.Z. 2017. Investment climate and performance of companies in Cameroon. Cameroon in the 21st Century: Challenges and Prospects 1(Governance and Businesses): 77 – 92.

Rose, E., Mamabolo, A. 2019. Transformational leadership as an antecedent and sme performance as a consequence of entrepreneurial orientation in an emerging market context. International Journal of Entrepreneurship 23(4): 1 – 16. https://www.abacademies.org/articles/Transformational-leadership-as-an-antecedent-and-sme-performance-as-a-consequence-of-entrepreneurial-orientation-in-an-emerging-market-context-23-4.pdf

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Rubio-Mozos, E., García-Muiña, F.E., Fuentes-Moraleda, L. 2019. Rethinking 21st-century businesses: An approach to fourth sector SMEs in their transition to a sustainable model committed to SDGs. Sustainability (Switzerland), 11(20): 5569. https://doi.org/10.3390/su11205569

Savitz, R., Dan Gavriletea, M. 2019. Climate Change and Insurance, Transformations In Business & Economics, 18, (1(46)), 21-43.

Serikbaeva, G.G., Bektanov, B., Bekturganova, A. 2019. Sources of Attracting Investments in Technological Innovation Projects to Ensure the Sustainable Development of Rural Areas, Journal of Environmental Management and Tourism 10(4): 935 – 941.

Siddique, A., Masood, O., Javaria, K., Huy, D.T.N. 2020. A comparative study of performance of commercial banks in ASIAN developing and developed countries, Insights into Regional Development 2(2): 580-591. https://doi.org/10.9770/IRD.2020.2.2(6)

Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan. Retrieved from: https://stat.gov.kz/

Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan. Statistics of small and medium-sized enterprises (SMEs). Official portal of the Committee on Statistics of the Republic of Kazakhstan. Retrieved from: https://stat.gov.kz/

Statistics of direct investments by the directions of investment. Gross inflow of direct investment in Kazakhstan from foreign direct investors. The official Internet resource of the National Bank of Kazakhstan. Retrieved from: https://nationalbank.kz/cont/%D0%98%D0%9F%D0%98%204q19%20%D1%81%D1%82%D1%80_%D0%BE%D1%82%D1%80_%D1%80%D0%B5%D0%B3%20%D1%80%D1%83%D1%81.xlsx

UNIDO. 2018. Competitive industrial performance report 2018. Biennial CIP report, edition 2018. Retrieved from: https://www.unido.org/sites/default/files/files/2019-05/CIP.pdf

Vijayalakshmi, R., Palanisingh, V., Lingavel, G., Gurumoorthy, T.R. 2019. Factors determining in foreign direct investment (FDI) in India. International Journal of Recent Technology and Engineering, 8(2 Special Issue 10): 722 – 729.

Wiklund, J., Davidsson, P., Audrestch, D.B., Karlsson, C. 2011. The Future of Entrepreneurship Research. Entrepreneurship Theory and Practice 1: 1 – 9. https://doi.org/10.1111/j.1540-6520.2010.00420.x

World Bank. 2020. Doing Business 2020. Washington, DC: World Bank. Retrieved from: https://openknowledge.worldbank.org/bitstream/handle/10986/32436/9781464814402.pdf

World Bank. Investment climate. Retrieved from: https://www.worldbank.org/en/topic/investment-climate

World Economic Forum. 2019. Global competitiveness report 2019: how to end a lost decade of productivity growth. Retrieved from: https://www.weforum.org/reports/how-to-end-a-decade-of-lost-productivity-growth

Arslan KULANOV
ORCID ID: https://orcid.org/0000-0002-8148-5411

Saltanat TAMENOVA
ORCID ID: https://orcid.org/0000-0002-2656-6040

Kamilya AMENOVA
ORCID ID: https://orcid.org/0000-0001-9561-5494

Alma KARSHALOVA
ORCID ID: https://orcid.org/0000-0002-0065-8369

Leila TUSSUPOVA
ORCID ID: https://orcid.org/0000-0001-7511-1889

ORGANISATIONAL SECURITY CULTURE IN SMALL ENTERPRISES: A CASE STUDY

Janusz Gierszewski [1], Andrzej Pieczywok [2]

[1]*Pomeranian University in Słupsk, Krzysztofa Arciszewskiego 22A, 76-200 Słupsk, Poland*
[2]*Kazimierz Wielki University in Bydgoszcz, Jana Karola Chodkiewicza 30, 85-064 Bydgoszcz, Poland*

E-mail: [1]* janusz.gierszewski@apsl.edu.pl (Corresponding author); [2]a.pieczywok@wp.pl

Abstract. The cultural crisis and the sense of loss of contemporary man are in a way a consequence of the imbalance between the uneven development of the sphere concerning his mentality and the technical and technological progress in the workplace. An increasingly important element of the contemporary human working environment is the culture of security, and one of its important parts is the organisational culture. This culture manifests itself in the behaviours and relations of individuals and employee teams, in courts and attitudes, in the way of solving problems and conflicts, organising work and human cooperation. It is an inseparable element of interpersonal relations and shaping order between cooperating people. The subject of the research was the organisational culture of TECHZBYT trade company. However, the aim is to determine to what extent the organisational culture of TECHZBYT company influences the level of employee security culture. Based on the subject and aim of the research, the following main research problem was formulated: What is the impact and significance of TECHZBYT's organisational culture on the effectiveness of operation and on the level of employee security culture? The research area has been made the TECHZBYT company, which is a local trading company with a certified quality management system in accordance with the requirements of the ISO 9002 standard. It is a leading trading and service company located in the Pomeranian Province, which deals with trade in metallurgical and construction products. The mission of TECHZBYT Sp. z o.o. is to meet customer expectations by distributing construction products of excellent quality in convenient places. The surveyed group consisted of employees of Techzbytsp. z o.o. and the research method used was a diagnostic survey (questionnaire tool). The group consisted of 30 basic level employees. The article consists of several parts, in the first part there is an introduction to the issue. Next, selected examples of defining security culture are presented. In the next part, the author's team indicated the need to conduct research in the area of a given organisation. The final part is empirical research on the evaluation of security culture in the organisational behaviour of employees.

Keywords: organisational culture; security; organisation; security culture

1. Introduction

The cultural crisis and the sense of loss of contemporary man are, in a way, a consequence of the imbalance between the uneven development of the sphere concerning his mentality and the technical and technological progress around it. Culture is an increasingly important element of the contemporary human security environment.

Therefore, the culture, and especially the culture of security, will be positively shaped by the broadly understood self-defence skills, supporting the strengthening of the sense of human security. We deal with it in all social strata and age ranges. Its knowledge, but above all the way it is manifested, influences the way we perceive and think about security. An important element of the culture of security is the subject's behaviours and actions, including his or her citizen's cooperation. All these elements become significantly more important in difficult or crisis situations, during which the culture of security is particularly visible.

A security culture is characteristic of all human activities in an organisation, including management, and affects all significant aspects of its functioning and the basic instruments and structure, strategy and procedure. Each organisation has its own specific characteristics, which influence what happens inside it and its contacts with the environment, often stronger than the authority of the leaders or the formal structure.

A culture of security is manifested in the behaviour and relations of individuals and employee teams, in courts and attitudes, in the way problems and conflicts are solved, work organisation and human interaction. It is an inseparable element of interpersonal relations and shaping order between cooperating people. The security culture in an organisation permeates all areas of activity of each institution, constituting a bridge between its past and future. Culture integrates, unifies, stabilizes, reduces uncertainty, promotes common vision of goals and facilitates finding ways to solve problems. It provides a strong foundation for the strategic activities of an organisation (J. Penc, 2010).

Security culture has quite a big connection with the broadly understood organisation culture. The starting point, and at the same time the main reason for its research was the need for information from management. The necessary information will enable or facilitate making a specific decision or a combination of decisions concerning the organisational improvement of the company, but also raise the security culture among employees to a higher level. Therefore, it is worthwhile to first of all examine the shape and profile of the organisational culture, identify the factors determining its change, determine its impact on the company's effectiveness, and assess the level of security culture.

The subject of the research was the organisational culture of TECHZBYT trade company. However, the aim is to determine to what extent the organisational culture of TECHZBYT company influences its task effectiveness on the one hand and on the other hand the level of employee security. On the basis of the subject and aim of the research, the following main research problem was formulated: *What is the impact of TECHZBYT's organisational culture on the effectiveness of its functioning and on the level of employee security culture*?

The following specific problems were formulated:
1) How is organisational culture understood and perceived by the subjects and what are its main determinants?
2) Which elements of the company's activities are most influenced by the organisational culture?

3) What is the relationship between the company's organisational culture and the security culture of employees?

The research area has been made the TECHZBYT company, which is a local trading company with a quality management system certificate in accordance with the requirements of the ISO 9002 standard. It is a leading trade and service company located in the Pomeranian Province, which deals with trade in metallurgical and construction products. The mission of TECHZBYT Sp. z o.o. is to meet customer expectations by distributing construction products of excellent quality to for their customers' convenient places.

The group studied consisted of employees of Techzbyt sp. z o.o. The research method used was a diagnostic survey and a survey questionnaire. The surveyed persons were divided into two groups. The first group consisted of the managerial staff in the number of 10 people, the second group consisted of the basic level employees in the number of 30 people.

2. Selected examples of defining a security culture

Culture is characteristic of all human activities within an organisation, including management, and affects all significant aspects of its functioning, including its basic instruments and structure, strategy and procedure. Each organisation has its own specific property, which influences what happens inside it and its contacts with the environment, often stronger than the authority of leaders or formal structure. Culture manifests itself in the behaviour and relations of individuals and employee teams, in courts and attitudes, in the way problems and conflicts are solved, in the organisation of work and human interaction. It is an inseparable element of interpersonal relations and shaping order between cooperating people. Culture permeates all areas of activity of each institution, being a bridge between its past and future. Culture integrates, unifies, stabilizes, reduces uncertainty, promotes a common vision of goals and facilitates finding ways to solve problems. It provides a strong foundation for the strategic activities of an organisation (Penc, 2010).

A review of various cultural concepts by A.L. Kroeber and C. Kluckhohn gave rise to a comprehensive, multi-faceted definition by them: "Culture consists of overt and covert patterns, of behaviours learned and transmitted by symbols, forming the specific heritage of human groups, and of the products of these behaviours: the core of culture are traditional, i.e. grown and selected in a historical process, ideas, and the values attached to them; cultural systems can be considered either as products of human activity or as conditions for further human activity" (Kroeber, & Kluckhohn, 1952).

This definition, very broadly speaking, is a kind of a boundary - on the one hand closing the historical aspect of the term's development, and on the other hand it contains a very rich collection of contemporary humanities, in the circle of research of which there is also culture, often giving the basis for formulating contemporary definitions of the term.

It is also worth mentioning here the rather commonly used form of classification of cultural fields, dividing it into material and spiritual. Very often the boundary between material and spiritual culture coincides with the distinction between culture and civilisation. The distinction between material and spiritual culture is often speculative. Nevertheless, these divisions seem important (culture - civilisation, spiritual culture - material culture), as the whole will constitute culture in a broad sense.

The culture of security through its elements allows to create a certain key to the interpretation of events, to direct actions aimed at strengthening the sense of human security. The use of its potential enables the creation of a stable environment conducive to security in its broadest sense.

The term security culture was first used by the Atomic Energy Agency, which issued a report on the Chernobyl disaster. Security culture is treated as a component of the organisational and social culture and as a whole of collective actions consisting of the application of organisational and interorganisational practices aimed at the protection of the individual employee and the entire working environment (Gherardi, Niccolini, 2000). The culture is also a set of values and beliefs within the organisation, creating specific patterns of behaviour. It is the result of individual and collective values, characteristics, perceptions, competences and patterns of behaviour that determine commitment to health and security at work.

The very concept of security culture, according to Professor M. Cieślarczyk is "a model of basic assumptions, values, norms, rules, symbols and beliefs characteristic for a given subject, influencing the way it perceives challenges, opportunities and/or threats in its closer and further environment, as well as the way it feels and thinks about security (...), and the related way of behaviour and action (cooperation), in various ways "learned" and articulated by this subject, in the processes of education in its broadest sense, including natural processes of internal integration and external adaptation and other organisational processes (...), as well as in the process of strengthening the defence in its broadest sense (not only militarily) (...), serving the harmonious development of this entity and its achievement of security in its broadest sense, for the benefit of itself and its environment" (Cieślarczyk, 2009).

And A. Filipek writes: "the culture of security can be treated as specific tendencies of individual communities or social groups, conditioned by an accepted hierarchy of values, serving to build a broadly understood defence, the result of which will be the actual ability to prevent threats, as well as the ability to create one's own development, conducive to the preservation and renewal of identity" (Filipek, 2008). Despite some differences in the interpretation of the term "security culture", it can be seen that both definitions attach great importance to the issue of values. This means that shaping the broadly understood security of students, based on an internal hierarchy of values, will be a manifestation of an important aspect of their security culture.

One of the most popular definitions of occupational security culture developed by the UK *Health and Safety Executive* (HSE) indicates that an occupational security culture is the result of individual and group values, attitudes, perceptions of competence, behavioural patterns and the style and quality of security management in an organisation. Organisations with a positive security culture are characterised by communication based on mutual trust, a common perception of the importance of security and confidence in the effectiveness of preventive measures (Horbury, Bottomley, 1997).

Shaping an appropriate security culture is one of the important elements of occupational health and safety/security management (Polish Standard PN-N-18001, 1999). Shaping a security culture is a continuous and multidimensional process to which all groups of employees in the company must submit. It is as much about passing on the relevant theoretical knowledge as it is about introducing it into everyday use. A safe work culture is created and then reproduced according to the system of accepted meanings in a given group of employees. Employees will only be willing to repeat their behaviour according to the adopted pattern if the adopted pattern is an understandable, obvious and unquestionable way of behaviour for them.

M. Cieślarczyk calls the dimensions of security culture "pillars of security culture" (Cieślarczyk, 2010). The components of these dimensions intertwine to some extent. For example, knowledge, which is a component of the first dimension of the culture of security, in addition to the values and principles that are recognised by man, is also the domain of the second rational-organisational-legal dimension of the culture of security (also connected with technical thought).

While recognizing the types, characteristics and dimensions of a security culture, one should not forget about its very close relationship to security
For both security and culture, there are two simultaneous characteristics - space and time. Physical space gives room for the emergence of security regions or threat areas and allows culture to expand to cover more and more territory.

Time creates a system of reference in which the process of building a culture takes place in a certain territory, twinned with the process of development of human individuals, social groups and entire nations - this development determines the level of their security.

The development process is the most powerful prevention mechanism, counteracting all threats and, even according to the definition of security - can be considered as an analogy of a security phenomenon in the process.

Culture is not only a certain "added value", but also represents an autonomous potential for the defence of the actors - in the military, political, socio-cultural, economic, environmental, health, and in such spheres of activity as legal-organisational, technogenic or cybernetic.

Culture in relation to entities operating in the area of its impact, from the personal scale to the social scale, is a mechanism that can influence the attitudes and behaviour of these entities in specific situations, processes or events that bring with them various challenges, opportunities, risks and threats (Piwowarski, 2016).

In our view, the culture of security is the awareness of shaping life in the perspective of the broadly understood balance between the structural thesis and deconstructive antithesis, is a subjective sense and, at the same time, a holistic way of thinking, a form of subjective activity in shaping the most perfect forms of existence, inscribed in sustainable development directions. In terms of safety culture, it is worth emphasizing the role of the subject's autonomy as a conscious person, perceiving and assessing processes and phenomena occurring in the environment and adequate to the needs of its change (Gierszewski et al. 2020).

Subjectivity embedded in the space of security is a reflection of the ontological, epistemological and ethical paradigm, and the culture of security is the pursuit of the development and improvement of such forms of duration that best meet the needs and ideas of the subject. The very expression "security culture" implies a humanistic provenance of security and stains its subjective dimension. Therefore, it is worth asking a question about the place and role of shaping a safety culture in an organisation.

The term 'security culture' refers to society, a group of people or organisations, and to individuals. That is why the culture of public, enterprise and individual security can be distinguished. The security culture of an enterprise is an important for employees' state of awareness of threats, standards of conduct in an emergency and organisational processes that affect the taking into account of safety in the company, organising tasks, supervising and assessing employees and explaining the causes of accidents. Security culture can also serve as a very useful theoretical model, having an explosive power, useful among others in the discipline of security sciences. Security

culture is quite an important determinant of the broadly understood organisation culture. The origins of the concept of "organisation culture" can be seen in the development of two currents in organisation and management theory. The first stream originates from the company's environment and stems from questions about the influence of the national culture of a particular community on management. The second is the so-called behavioural school, where interpersonal processes and group dynamics within an organisation are of interest (C. Douglas, 2017). In economic literature, depending on the concept and approach, the definitions of organisational culture take very different shapes. Some researchers represent the view that culture is not something that an organisation has, culture is something that an organisation is, while others claim that culture exists within an organisation.

The distinction between "good" security culture and "bad" culture suggests that there are some specific properties correlating with the safe operation of the enterprise.

The elements of company culture are: tradition, norms (directives, principles), system of values (ideas and images) and beliefs (human attitudes and their orientations, e.g. for market activities), as well as various creations of a given culture called artefacts, which are visible and aware on the outside (physical artefacts - material creations of a given culture, such as: art, technology, material objects; behavioural artefacts, such as ceremonies and rituals, and linguistic artefacts, such as the specific language of an organisation, myths and legends).

3. The need for research into the security culture in the organisation

A security culture plays quite an important role in any environment that creates social capital. The organisation's environment is also an important reference. In this environment it needs to be based on positive values indicating clear rules of conduct. Employees should have a conviction of the quality and universality of their work. Organisations are the place where the employee does his or her job, on the one hand, and should work on his or her personal and professional (specialist) development on the other. A positive attitude towards oneself translates into a friendly and favourable attitude towards others. This makes it possible to learn about one's own potential perceived as a source of life energy, self satisfaction and achievements. Internal calmness together with acquired knowledge and skills leads to innovation and creativity in creative solving of widely understood problems. These are benefits that result from the full use of the potential inherent in the culture of security. It should also be stressed that the use of a cultural perspective in an organisation's environment can foster a better understanding of many dimensions of human security among employees. Using the potential of a security culture to build broadly understood employee coherence allows reducing the specific gap between growth and the ability to meet security needs. This will enable employees to counteract failures and use opportunities and challenges to their advantage.

Recently, there has been an increase in the number of accidents in organisations related to employees' non-compliance with security culture. It seems that organisations are a special place to promote and develop knowledge, technology and security culture. Therefore, it is important to assess the key aspects of security culture related to occupational risk assessment, prepare employees for emergencies, the health and security training process, preventive health protection and attitude to threats. Health and security training and evacuation exercises in many organizations are rare. Organizations care for the safety of their employees differently, while educating them little in the field of health and security and fire protection, first aid and crisis management.

The risks posed by employees in the organisation may come from three sources. First, incorrect behaviour of the employee himself. Disregard for the threat and instructions, insufficient focus on the activity, unexpected surprise, haste. Sometimes, it is inappropriate for an employee to behave arbitrarily, including: performing activities without removing hazards in the danger zone, entering or entering the danger zone without making sure that there

is no danger, not using personal and collective protection equipment and safety devices. The impact of negative psychophysical factors may deteriorate an employee's state of health, reduce their intellectual performance or even cause illness. Thirdly, from the so-called social work environment (bad interpersonal relations prevailing in the organisation). Violence, aggression, emotional blackmail, verbal insults, racism, bullying, sexual harassment can lead to physical and mental illness. Depression, concentration disorders, anxiety, neurosis, suicidal thoughts - these are just some of the ailments accompanying the bullying of employees. Long-term tension can also result in heart, circulatory, stomach or intestinal diseases, shortness of breath, headaches and often permanent insomnia (Bernardi, 2019).

It should be stressed that the need to research the security culture in an organisation is also influenced by the improvement of working conditions, especially in practical (specialist) work. Thus, achieving optimal working conditions and reducing the risk to an acceptable level will improve security. However, ensuring adequate working conditions is not enough, as much depends on the employees themselves, both mentally and practically. If technical and system solutions for security are already in place in organisations, we can only achieve an improvement in security culture. Creating a high security culture among employees requires the organisation to be seen to be committed to security and life and health protection. Special attention to the development of a security culture deserves training to create the right attitudes and raise awareness among employees as part of a health and security culture. A high security culture significantly reduces the number of accidents at work, and training in this area makes it possible to raise the awareness of university staff in the field of occupational health and security and reduce accidents.

There are three main factors that contribute to the emergence of organisational security cultures: management commitment, responsibility and awareness (Bulgurcu et al. 2010; Herath and Rao 2009). Management commitment can be measured by perceiving management's efforts to achieve organisational goals, which is reflected in an organisational culture based on employee engagement and adapting goals to effectiveness (Knapp et al. 2006).

Views on the culture of the organisation were built over many years and were influenced by case studies that the authors implemented in various aspects of security, including security management and culture (Shedden et al., 2006; Maynard, Ruighaver, 2006, Koh et al.). In some case studies, the safety security culture was observed as part of understanding other aspects of safety security, while in others particular emphasis was placed on the safety security culture of the organization. Our research concerned an organisation where decision making in terms of security was dispersed and loosely controlled.

4. Security culture in the organisational behaviour of employees

Men prevailed among the surveyed employees, who constituted over 83% of the respondents (25 people). The structure of employees is similarly distributed by gender (see figure 1).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
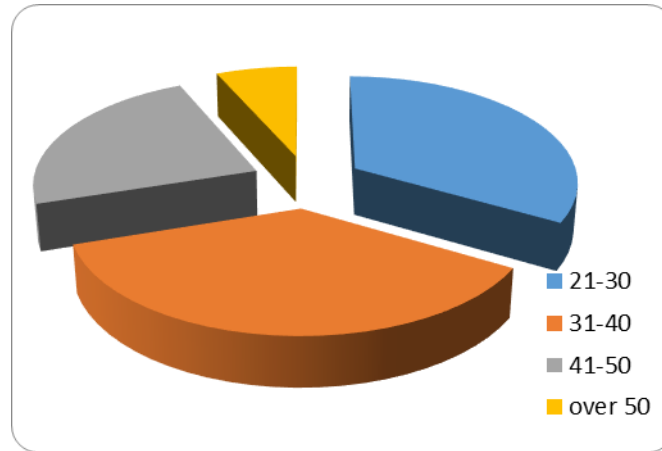

Fig. 1. Age structure of respondents

The dominant group of employees in terms of age are middle-aged people, i.e. 31-40 years of age - about 37%, the second group are young people up to 30 years of age - about 33%. In terms of education, the dominant group of respondents were people with secondary education. Among 30 respondents - 24 were with secondary education i.e. 80%, five with higher education (17%). Among the surveyed employees there is one person with vocational education. Among the employees, 20% had seniority of up to five years, of which 13% had up to five years and 7% had up to one year. The most numerous group were people working from 6 to 10 years, - about 47%. A large group was made up of people who had worked in the company for 11 years or more - 10 people among the respondents - i.e. 33% (see figure 2).
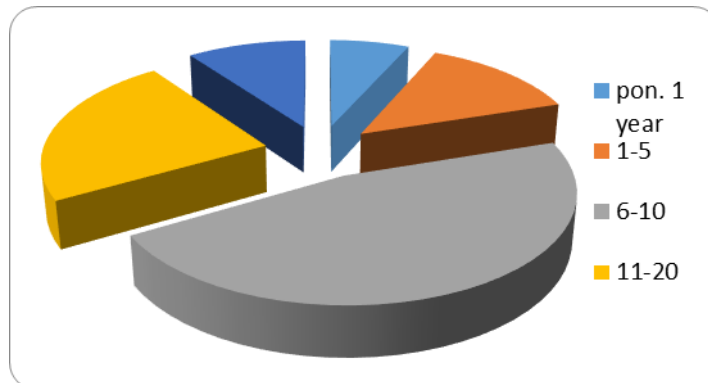

Fig. 2. Seniority of respondents

Among the respondents there were 10 people who held managerial or managerial positions in retail outlets. The remaining 20 people were sales department employees and employees employed in the company's headquarters.

The next question asked to the employees was the question related to satisfaction with their work. 73% of people answered that they were satisfied or rather satisfied. With only 23% fully satisfied, the remaining 50% were rather satisfied. About 17% were dissatisfied with their work. Those who did not have an opinion or did not care - 10%. The figure 3 below shows these relationships.
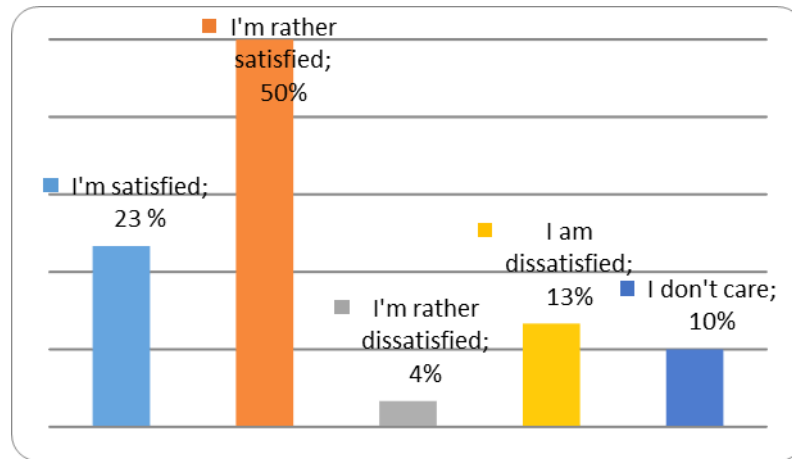
Fig. 3. Satisfaction with the work performed

The next question was about how to understand the definition of organisational culture. The figure 4 below shows the distribution of answers.
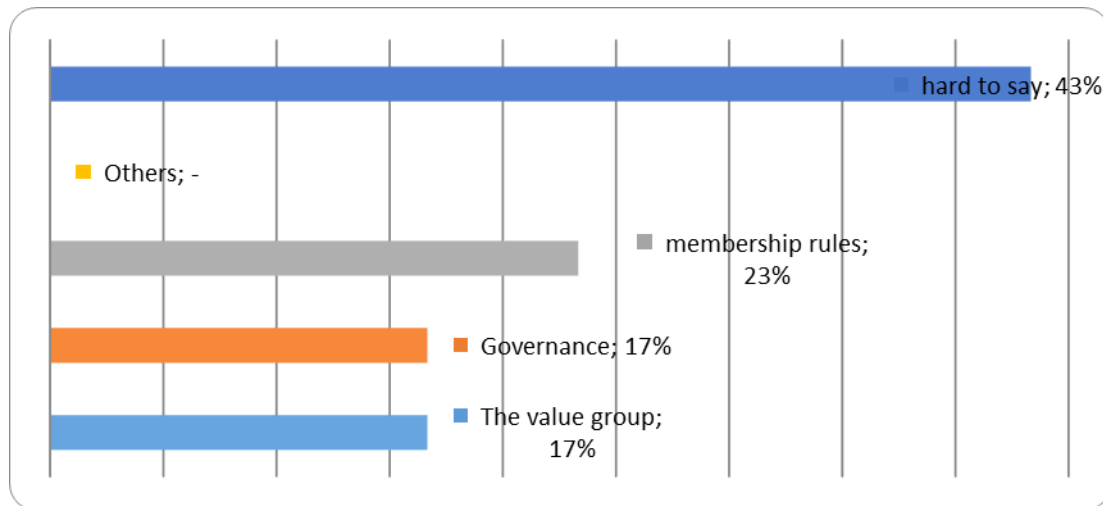

Figure 4. Understanding the definition of organisational culture

A very large percentage of respondents did not know what it was and how it defined the concept of organisational culture. Over 43% of the respondents were unable to answer what organisational culture is. 23% answered - that it is a set of values of tradition, beliefs, attitudes that function within the company. 17% each considered that there are rules of belonging to a given company and that there is a way of management, organisational climate and interpersonal relations.

As almost half of the people did not know what organisational culture was in the next question about the detailed character of organisational culture, whether it is positive or negative, conservative or innovative, masculine/female or silane/weak respondents had a problem with answering this question. Most - 20 people answered that they did not know the answer to this question. Only 10 people - all managers were able to answer

the question. The scope of managers' answers about the nature of organisational culture is presented in the table 1 below.

Table 1. Nature of organisational culture according to the respondents

N.	Type of culture	Number of indications
1	conservative	10
2	bureaucratic	9
3	male	8
4	strong	8
5	female	2
6	pragmatic	1

Source: Own research

Most managers describe the organisational culture in Techzbyt sp. z o.o. as conservative, male, bureaucratic and strong. The next question concerned the influence of organisational culture on the functioning of Techzbyt sp. z o.o. Data on this subject is presented in the figure 5 below.
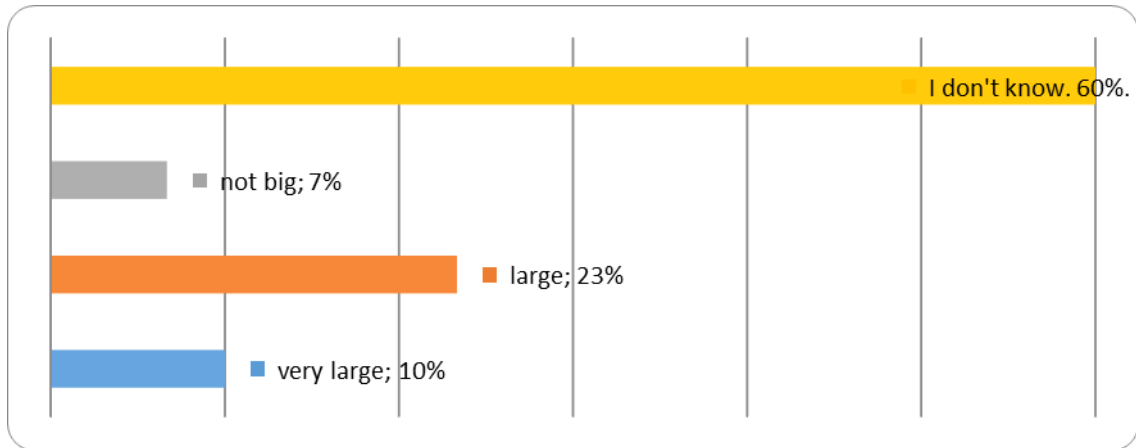
Figure 5. Understanding the definition of organisational culture

60% of those surveyed did not know if such an impact existed on their company. 33% of those surveyed said it was large and very large. The answers were mainly given by managers, the rest replied that it was not large - 7% and they were most likely administrative staff.

In response to the question concerning the values of Techzbyt sp. z o.o. most of the respondents (50%) replied that the company is profit-oriented. And 1/3 of the respondents replied that they respect and care for the employee. A large percentage of those surveyed were not able to answer with what their company is aiming at. This information is illustrated by the figure 6 below.

Fig. 6. Evaluation of the values that Techzbyt is guided by

The respondents in the next question defined the factors that influence the development of the company. The answers were quite diverse. Only one factor received more than 30% of the indications. It concerned customer loyalty. The employees are aware that without customers the company will not function and thus will not develop (see table 2).
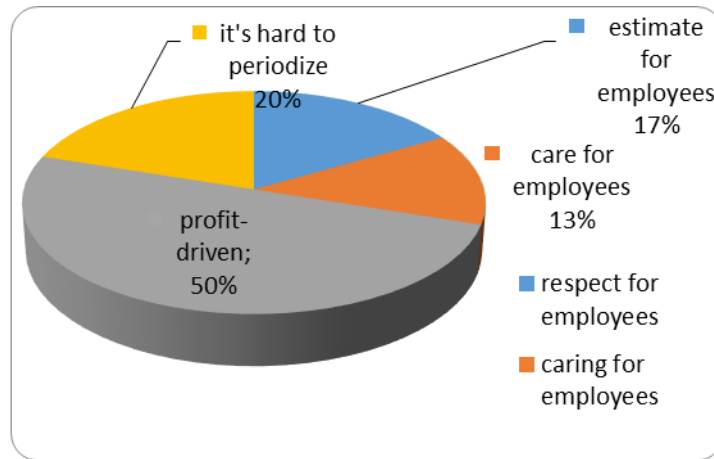
Table 1. Factors that influence the development of the company

N.	Answers	number of people	%
1	Leadership	3	10
2	brand value	3	10
3	Reputation	1	3
4	knowledge of employees	5	16
5	Culture	1	3
6	Innovation	2	6
7	Communication	5	16
8	Customer loyalty	10	33
9	Total	30	100

A high response rate of 17% was achieved by communication and staff knowledge. Three answers were given for leadership and brand value. The answer in the sales company concerning innovation is surprising. One answer each was given to the reputation, which is derived from the question of brand value and culture - as a factor influencing the development of the company.

The next question was whether the loyalty and commitment of employees is influenced by the culture of the organisation. As most of the respondents did not know the definition of culture, negative answers were obtained. Most of the respondents replied rather not (43%). Only managers gave affirmative answers (34% in total), but not definitely affirmative answers (27%).

A positive aspect among the respondents is the knowledge of company strategy. The most. i.e. more than 90% of people know the company's strategy well or very well. Only 7% did not know the strategy to the end - giving answers rather not. A similar distribution of votes concerned the pleasant atmosphere at work. 40% of the

respondents answered definitely yes to this question. Another 53% rather yes. Only 7% of the respondents did not like the atmosphere at work - but answered rather not.

Since salespeople are obliged to wear special clothing with the company's logo in shops and company outlets, the question concerning the habit of wearing the logotype will be answered by 100% of those surveyed definitely yes (83%) and rather yes (17%). Those who answered yes are administrative employees who are not obliged to wear special clothing.

The next questions concerned the trainings organised by the company. The Management Board of Techzbyt sp. z o.o. has developed its own internal training program for its employees working in the sales department. Depending on the nature of work, they participate in various forms of training. The company organises cyclical, semi-annual conventions for its shop managers. During such conventions, the managers are acquainted with action plans for the coming months, but also participate in trainings organised by the Technical Service Department.   For employees - salesmen, trainings on customer service are organised once a year. It takes place in 3-4 turns per year. Each such turn is attended by one employee from a given store, so that the staffing of a given facility is ensured. During such one-day training, employees receive knowledge of customer service, nice looks and tidy clothes. They also learn about new products offered in stores and their properties. During such training, they learn what to offer customers and how to advise them on product selection.

The evaluation of this system has been satisfactory. The training programme is evaluated well by the employees. Most of the answers were rather yes, which was 83%, while 17% were very satisfied with the training system and what they achieved from it. The question of providing comments and ideas and opinions during the training is worse. Here, there are negative answers - rather not - but only - 17%. Due to the fact that there is no motivation system in Techzbyt sp. z o.o., the questions concerning the existence of motivation and its role in the organisation were negative. Only two people think that there is an incentive system. The remaining 28 replied that they were unlikely to (25 people) or definitely not (3 people). Also negative answers were given to the question concerning the organisation of sport and recreation events, because the company does not organise them. Another issue in the questions was communication. The respondents were supposed to answer what, in their opinion, is the communication in the company. According to the respondents, communication at Techzbyt is insufficient (26 answers), inconsistent (17) and official (22 answers). It goes from top to bottom (27 answers) and is written. It is significant that negative answers were also given by managers, who most probably do not make any changes in this direction. The survey asked a question about what the employees are rated highest for. Most of the people surveyed answered, concerning professionalism at the workplace. There were as many as - 43%, i.e. 13 people think so. Then it was focused on results - 7 people, i.e. 23%, answered this way. Only in the third place the respondents indicated their knowledge - 20% (i.e. 6 answers). Most probably, these were people working in administrative positions in accounting or technical department. The results are shown in the figure 7 below.
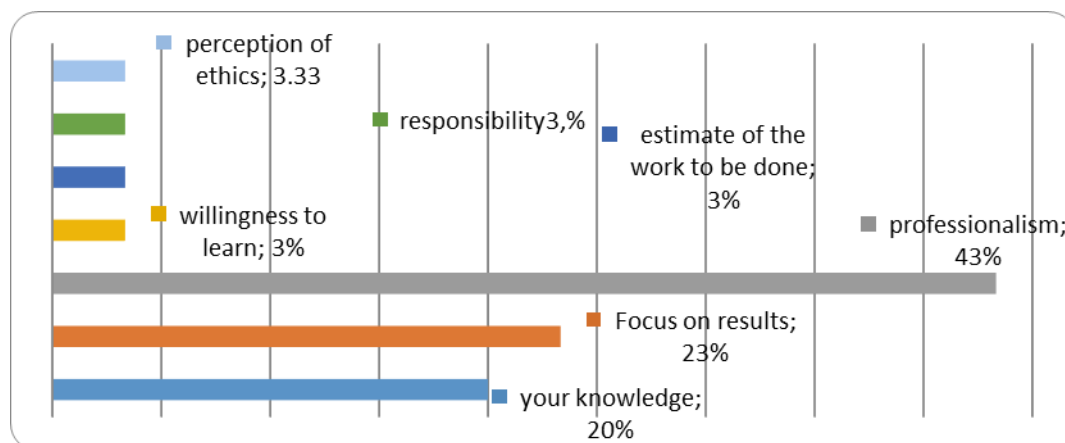
Fig. 7. Evaluation of the most evaluated areas of employees' functioning

The last question was what should be changed at Techzbyt. As far as changes in the way of management, control system and changing office equipment are concerned - the respondents did not answer (see figure 8).
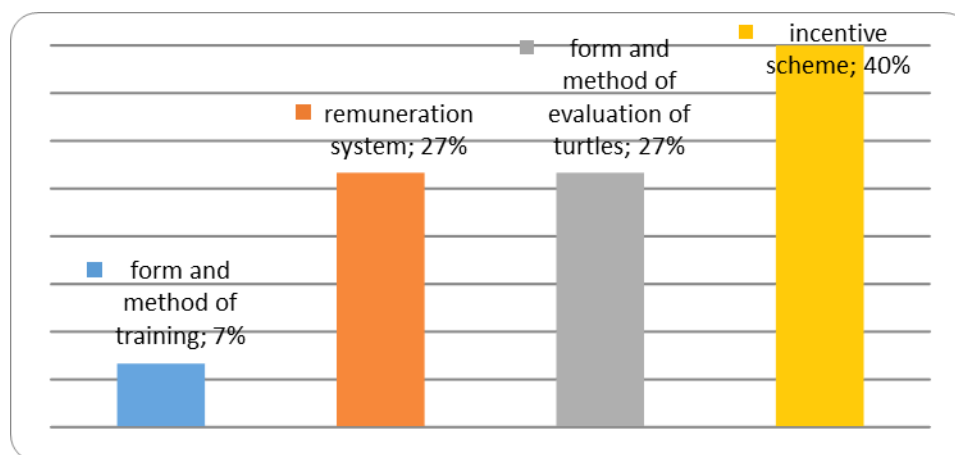
Fig. 8. Indication of changes in the modes of operation of the tested function and baad

On the other hand, the respondents want mainly changes in the motivation system - 40% (12 people), the way of evaluating employees - 27% (8 answers). The same number of respondents want changes in the remuneration system. Two people want changes in the way training is conducted.

Conclusions

The research conducted in Techzbyt Sp. z o.o. allowed to determine the functioning of the organisational culture in this company, which has quite a significant impact on the level of security culture. The lack of information about elements of culture in this company is clearly visible. To a large extent, the middle management of the company is to blame. Employees do not know what the organisational culture is, and how to relate its meaning to security and what it is characterized and manifests and what elements it contains. Employees do not know how to define the concept of organisational culture, only some of the employees in managerial positions know what it is.

After the survey, the following statements can be summarised:
1. Lack of information on the organisational culture among the ordinary employees of retail outlets (sellers), only partial knowledge of this issue among the ordinary administrative staff.
2. Managers are better aware of their organisational culture. However, they do not inform their subordinates.
3. There is a belief among the staff that the management of the company is solely profit-making. According to the respondents, there is a low level of respect and not enough care for employees.
4. There is a low level of satisfaction with the incentive system and the level of remuneration. The incentive system does not exist at the level of regular employees. The main beneficiaries of this system are managers of shops and retail outlets who receive discretionary bonuses.
5. The company's existing training system is satisfactory, but can be improved by making changes to its organisation (concerns the way ideas and comments are communicated)
6. In the company, communication is very formal, only towards the employee manager, not the other way round. Most of them think that it is insufficient and inconsistent.
7. There is no employee appraisal system in the company which would contribute to the introduction of an incentive system and enable the best employees of retail outlets to increase salaries.
8. There is a high awareness of professionalism among employees, but due to the lack of a motivational system it does not release additional energy for new duties.

It can be concluded that the average employee - a salesman - does not know the organisational culture in his company is and what it is. At Techzbyt company, there is too little communication between middle management and employees in terms of providing information that is highly formalized. There is no system to motivate and support employees in their professional development. The main focus of the company's management is on earning the highest possible profit without taking too much care of the employee. Based on the research, it can be concluded that building a high security culture in the company is primarily favoured by the belief that security is a value connected with every objective of the organisation.

The research shows that most managers of retail outlets cannot properly communicate with the staff.
In order to better organise work and create a proper security culture it is essential that
- Managers better inform their subordinates about the elementary principles of organisational culture and elements of their own,
- Introduce an employee appraisal system on the basis of which to build an incentive system,
- Prizes should be related to efficiency and not to internship or other considerations not related to merit,
- Managers must recognise that employees have different motivations and talents,
- Managers should cultivate an efficient company culture,
- Introduce a system of two-way communication, not one-way communication,
- Improve the training system to enable employees to make their own comments and reflections, Enabling employees to develop and advance professionally.

Organisational culture is created by a set of standards, values and beliefs characteristic of a given organisation, to which employees apply and which determine the way of life of individuals and groups in the organisation. Whereas the security culture is an element of organisational culture. It is a product of individual and group values, attitudes, competences and behaviour patterns that determine involvement in activities related to security management in the organisation and affect the style and effectiveness of this management. The researchers

focused on one company, what is a research limitation. Nevertheless, we believe that further researchers can echo analysis of the case study and, ultimately, a gap of peculiarities of security culture will be filled in.

References

Bernardi, A. (2019). The capability approach and organizational climate as tools to study occupational health and safety. *Insights into Regional Development,* 1(2), 155-169. https://doi.org/10.9770/ird.2019.1.2(6)

Bulgurcu, B., Cavusoglu, H., & Benbasat, I. (2010). *Information security policy compliance: an empirical study of rationality-based beliefs and information security awareness*. Mis Quarterly, 34(3), 523-548. http://130.18.86.27/faculty/warkentin/BIS9613papers/MISQ_SpecialIssue/BulgurcuCavusogluBenbasat2010_MISQ34_RationalityAwareness.pdf

Cieślarczyk, M. *Teoretyczne i metodologiczne podstawy badania problemów bezpieczeństwa i obronności państwa (Theoretical and methodological bases for research on the problems of state security and defence)*, Wyd. Akademia Podlaska, Siedlce 2009, p. 157.

Cieślarczyk, M. (2010). *Fenomenomen bezpieczeństwa i zjawisko kryzysów postrzegane w perspektywie kulturowej (The phenomenon of security and the phenomenon of crises perceived from the cultural perspective),* [in:] *Jedność i różnorodność,* ed. E. Rekłajtis, B. Wiśniewski, J. Zdanowski, ASPRA-JR, Warsaw p. 96 et seq.

Douglas, C. (2017). *Adapting To Organisational Culture*. A StagedAdaptation Model, p. 24, https://uhra.herts.ac.uk/bitstream/handle/2299/20284/14072596%20%20Douglas%20Claire%20final%20version%20of%20submission.pdf?sequence=1

Filipek, A. (2008). *Poziom i charakter kultury bezpieczeństwa młodzieży akademicademickiej (The level and character of safety culture of academic youth)*, Wyd. Akademia Podlaska, Siedlce, p. 164.

Gierszewski, J., Drabik, K., Pieczywok, A. (2020). *Bezpieczeństwo kulturowe w trakcie zmian społecznych (Cultural security during societal changes)*, Difin Warszawa p. 23.

Gherardi, S., Niccolini, D. (2000). The organizational learning of safety in communities of practice. *Journal of Management Inquiry*, 9(1). https://www.academia.edu/17397679/The_Organizational_Learning_of_Safety_in_Communities_of_Practice

Herath, T., & Rao, H. R. (2009). Protection motivation and deterrence: a framework for security policy compliance in organisations. *European Journal of Information Systems*, 18(2), 106-125. https://www.tandfonline.com/doi/abs/10.1057/ejis.2009.6

Horbury, C.R., Bottomley, D.M. (1997). Research into health and safety in the paper industry. *Health & Safety Laboratory*, IR/RAS/98/2

Knapp, K. J., Marshall, T. E., Rainer, R. K., & Ford, F. N. (2006). Information security: management's effect on culture and policy. *Information Management & Computer Security*, 14(1), 24-36. https://www.emerald.com/insight/content/doi/10.1108/09685220610648355/full/html

Koh, K, Ruighaver. A.B, Maynard, S, Ahmad, A. *Security governance: its impact on security culture*. In: Proceedings of the third Australian information security management conference, Perth, Australia; September 2005. https://www.researchgate.net/publication/221148273_Security_Governance_Its_Impact_on_Security_Culture

Kroeber, A. L., & Kluckhohn, C. (1952). Culture: a critical review of concepts and definitions. *Papers. Peabody Museum of Archaeology & Ethnology, Harvard University,* 47(1), viii, 223.

Maynard, S, Ruighaver, AB. (2006). *What makes a good information security policy: a preliminary framework for evaluating security policy quality*. In: Proceedings of the fifth annual security conference, Las Vegas, Nevada USA; 19–20 April 2006. https://pdfs.semanticscholar.org/1dc9/a825ec985b02d8215b82bc115a34f2ba9cc5.pdf

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Penc, J. (2010). *Kultura i etyka w organizacji. Aspekty pragmatyczne i strategiczne (Culture and ethics in the organization. Pragmatic and strategic aspects),* Wydawnictwo Wyższej Szkoły Policji w Szczytnie, Szczytno p. 61

Piwowarski, J. (2016). *Nauki o bezpieczeństwie. Zagadnienia elementarne (Security Sciences. Elementary issues. Elementary issues)*, Wyd. Wyższa Szkoła Bezpieczeństwa Publicznego i Indywidualnego APEIRON, Kraków p. 119. http://apeiron-wydawnictwo.pl/wp-content/uploads/2019/09/piwowarski-nauki-o-bezp-wydanie-2-2017-book.pdf

Polish Standard PN-N-18001 *Systemy zarządzania bezpieczeństwem i higiena pracy*, July 1999

Shedden, P, Ahmad, A, Ruighaver, A.B. *Risk management standards– the perception of ease of use. In: Proceedings of the fifth annual security conference*, Las Vegas, Nevada, USA; 19–20 April 2006.

Shedden, P., Smith, W., Ahmad A. (2010) *Information Security Risk Assessment: Towards a Business Practice Perspective,* Edith Cowan University Research Online http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.258.5345&rep=rep1&type=pdf

Janusz GIERSZEWSKI is a professor at the Pomeranian University in Słupsk, deputy director of the Institute of Security and Management. Author of about a hundred publications on many aspects of security. Research interests: security, social and cultural threats; sustainable development.
ORCID ID: 0000-0002-8420-7900

Andrzej PIECZYWOK is a professor at the University of Kazimierz Wielki in Bydgoszcz, Research interests: security, social and cultural threats; education for security.
ORCID ID: 0000-0002-4531-0630

Publisher
http://jssidoi.org/esc/home

DOES ENTREPRENEURIAL EDUCATION DRIVE STUDENTS' BEING ENTREPRENEURS? EVIDENCE FROM INDONESIA[*]

Djoko Dwi Kusumojanto [1], Bagus Shandy Narmaditya [2], Agus Wibowo [3]

[1,2] Faculty of Economics, Universitas Negeri Malang, Jalan Semarang 5 Malang, 65145, Indonesia
[3]Faculty of Economics, Universitas Negeri Jakarta, Jalan Rawamangun Muka, Jakarta Timur, 13220, Indonesia

Email: [1]djoko.dwi.fe@um.ac.id ; [2] bagus.shandy.fe@um.ac.id ; [3] agus-wibowo@unj.ac.id

Abstract. The aim of the present study was to investigate the role of entrepreneurship education and entrepreneurial intention by adding the current data in the context of Indonesia. This study also involves some variables that predicted affect students' entrepreneurial intentions, including entrepreneurial self-efficacy and entrepreneurial attitude. The study design applied in this research was a survey method with a quantitative approach to help understand the relationship between variables. This study used a convenience random sampling technique to collect the information of students in several state universities in Indonesia. The participants of this study were students in the second and third-year study who enrolled in the course of entrepreneurship and education and actively participated in programs of entrepreneurship. This investigation confirms four hypotheses and rejects the two hypotheses proposed. In more detail, entrepreneurship education successfully influences entrepreneurial self-efficacy and students' attitudes toward entrepreneurship. However, it failed in promoting students' intention of being an entrepreneur. On the other hand, entrepreneurial self-efficacy has an impact on entrepreneurial attitude, while entrepreneurial attitude does not influence on students' entrepreneurial intentions. Lastly, from this study, it showed that entrepreneurial attitude insufficient in mediating entrepreneurship education and intention being entrepreneurs.

Keywords: entrepreneurial education; entrepreneurial intention; entrepreneurial attitude; self-efficacy

---

1. Introduction

An important question continually confronted by governments in both developed and emerging countries is how to incline the number of entrepreneurs. The fundamental rationale is that small and business provides new job opportunities that can contribute for economic development, economic growth and community wellbeing (Turkina & Thai, 2013; Hoz-Rosales et al., 2019; Tung et al., 2020). One way to escalate entrepreneurs is through entrepreneurial education program to ensure individual have adequate knowledge needed for preparing a business. Scholar have documented the role of entrepreneurship education as a driving factor to insight into entrepreneurship from the formal education side (Maresch et al., 2016; Gerba, 2015; Bae et al., 2014).

As was pointed the essential role of entrepreneurial education, Kourilsky and Walstad (1998) suggested to enhance the entrepreneurship education from elementary school to tertiary education, particularly on developing countries. Likewise, Indonesian government also promotes an entrepreneurship program for students, which intended to boost the number of entrepreneurs (Saptono et al., 2018; Purwana et al., 2019). The policy to increase the number of entrepreneurs in Indonesia is forecasted in two primary functions; accelerating the presence of prosperity and reducing the number of unemployed young people (Patricia & Silangen, 2016; Utami, 2017).

In the context of Indonesia, the unemployment rate in Indonesia by approximately 5.28 per cent is dominated by college graduates (Statistics Indonesia, 2019). Dealing with this issue, universities in Indonesia need to revitalize the implementation of entrepreneurship education. Furthermore, universities require a comprehensive model of entrepreneur education, covering targets, learners, content, methods, and evaluation by placing targets as a central component (Muwarni, 2016; Gautam & Singh, 2015). The lack of entrepreneurial intentions among college graduates needs to be concerned by the government. Entrepreneurial intentions can be seen from the willingness to work hard and diligently to achieve business progress, the willingness to bear the various risks associated with doing business in doing it, willing to take new paths and ways, willingness to live frugally and to learn from experience.

Accordingly, entrepreneurial intention among university students can be explained by several factors, including norms, self-efficacy, environment, education, and attitude (Maresch, 2016). Having already witnessed a review of this field, Uddin and Bose (2012) pointed out that the tendency to take risks, the need for achievement, education and the environment to start a business, job security is essential in determining student intentions. In acquaintance with entrepreneurship education, Zhao et al. (2005) found a positive correlation toward entrepreneurial intentions, particularly when this relationship works according to favourable perceptions of entrepreneurship. Wu and Wu (2008) noted educational factors that influenced attitudes toward and perceived behavioural control positively influenced student entrepreneurial intentions. However, from the study, it found that subjective norms did not significantly influence entrepreneurial intentions.

Based on the theory of planned behaviour (TPB), attitudes and perceived behavioural have a correlation, while subjective norms have a lower significance. A prior study by Zhang et al. (2014) demonstrated that education has no influence on intention, whilst knowledge also has no impact on individual ability. Samydevan et al. (2015) added that psychological, educational and cultural characteristics influence entrepreneurial intentions among students in Malaysia. In addition, Ferreira et al. (2017) stated that self-efficacy has a relationship with intention of being entrepreneurs. Meanwhile, Ogunleye and Osagu (2014) revealed that self-efficacy, achievement motivation, age and gender did not significantly predict entrepreneurial orientation. Gedik et al. (2015) indicated that three attitude variables towards entrepreneurship, role models, and entrepreneurship education courses contributed to

student motivation in entrepreneurship. Furthermore, Tong et al. (2011) found students would choose to become entrepreneurs as long as there was a need for achievement, family business background, and subjective influence.

This study contributes of the present study are three folds. First, it contributes to the existing litrerature on factors affecting students being entrepreneurs by enhancing variables self-efficacy and entrepreneurial attitude that is missing in the prior works. Second, the inevitable studies of entrepreneurship education and entrepreneurial intention have largely investigated across the world. For instance, Tung et al. (2020) in Vietnam and Philippines, (Maresch, 2016) in Ethiopia, Uddin and Bose (2012) in Bangladesh, while this study has been conducted in Indonesia. The focus on Indonesia is unique due to the fact that the lack of entrepreneurs although it has great market and resources (Eryanto, 2019; Saptono et al., 2019). Additionally, this study presents an insight into the mediating role of self-efficacy and entrepreneurial attitude in explaining students intention being entrepreneurs.

2. Theoretical background

2.1 Entrepreneurship Education

Fayolle and Gailly (2015) revealed that entrepreneurship education emphasizes on preparing business plans, how to get financing, business development processes, and small business management. The education provides knowledge about the principles of entrepreneurship and technical skills regarding business management. Wang (2004) found that the inadequate level of students' perception and knowledge on entrepreneurship before taking entrepreneurial education. Lee and Wong (2003) asserted that entrepreneurship education in tertiary institutions has a direct relationship in shaping the attitude of students in taking risks for the establishment of new businesses. For these reasons, entrepreneurship education must be designed in such a way as to have an impact on encouraging students' intention to become entrepreneurs.

In the literature, several prior studies have investigated the entrepreneurial education and intention being entrepreneurs in many countries. For instance, (Maresch, 2016) showed a positive correlation between those variables in Ethiopia. Indeed, in Bangladesh, Uddin and Bose (2012) found that entrepreneurship education influences students' entrepreneurial intention. The study of entrepreneurship education was also conducted in other countries in Vietnam and the Philippines (Tung et al., 2020). Also, Zhao et al. (2005) pointed out relevant implications that entrepreneurship education is positively related to entrepreneurial intentions, primarily when this relationship works according to favourable perceptions of entrepreneurship.

The entrepreneurial intention is measured by several indicators, including involvement in entrepreneurship programs on campus, starting self-employment after graduation, working with excellent partners after graduation and starting entrepreneurship if there is funding support (Autio et al., 2001; Kolvereid & Isaksen, 2006; Zhao et al., 2005). Furthermore, Turker (2009) proposed the indicator to measure intention, such as choosing the path of business rather than working for someone else, choosing a career as an entrepreneur, and planning to start a business. Meanwhile, Shapero and Sokol (1982) expressed that entrepreneurial intentions depend on three elements: a sense of desire, a tendency to act, and a sense of worthiness. A sense of desire is defined as the personal attraction of starting a business. Eligibility is considered understood as a belief in the ability to start a business, and a tendency to act refers to one's disposition to act decisively when faced with an opportunity.

In addition, a correlation between entrepreneurship education and self-efficacy have confirmed by Saptono and Wibowo (2018); Wibowo et al. (2018). Indeed, Keat et al. (2011) mentioned that the primary goal of entrepreneurship education is to change the views, behaviours, attitudes and intentions of students to understand entrepreneurship, have an entrepreneurial mindset, and later become successful entrepreneurs building businesses.

Similarly, Sizong et al. (2008) also argue that entrepreneurship education significantly influences a person's attitude to be an entrepreneur. Besides, the influence of entrepreneurship education and entrepreneurial attitude was documented by Ambad and Damit (2016); Lüthje and Franke (2003); Ozaralli and Rivenburgh (2016); Turker and Selcuk (2009); Yang (2013), which indicates that the entrepreneurial attitude has an impact on intention being entrepreneur.

H1:   Entrepreneurship education influences students' entrepreneurial self-efficacy
H2:   Entrepreneurship education influences students' entrepreneurial attitude
H3:   Entrepreneurship education influences students' entrepreneurial intention

2.2 Self-efficacy
In addition to entrepreneurial education, the formation of student entrepreneurial intentions is self-efficacy. According to King (2012), self-efficacy is the belief that someone can master a situation and produce various positive results. Self-efficacy helps people in various unsatisfactory situations and encourages them to believe that they can succeed. Self-efficacy plays a role in decision making, thought processes, and courage in taking risks. Every individual who has high entrepreneurial intentions will be able to stand alone, dare to make decisions, and implement goals to be achieved at their discretion. This shows that the higher the self-efficacy will lead to greater entrepreneurial intention (Ogunleye & Osagu, 2014). Several prior studies believed that self-efficacy will lead to the intention of being entrepreneurs (Ayodele, 2013; Guzmán-Alfonso & Guzmán-Cuevas, 2012), while the results of some researchers showed an insignificant impact between self-efficacy and entrepreneurial intention (Ferreira et al., 2017; Ogunleye & Osagu, 2014).

H4:   Entrepreneurial self-efficacy influences students' entrepreneurial attitude

2.3 The mediating Role of Entrepreneurial Attitude
Another significant aspect of intention being entrepreneurs is attitude. Keat et al. (2011) pointed out that students' entrepreneurial intention is affected by entrepreneurship education. Through the learning process on entrepreneurship, it will lead to changes in behaviours and interests of students in order to understand entrepreneurship and have an entrepreneurial mindset and later become entrepreneurs. Similarly, Wu and Wu (2008) confirmed that entrepreneurship education significantly influences an individual's attitude to be an entrepreneur.

Rosmiati et al. (2015) noted that attitude is an emotional readiness in some action on something appropriate or as something that is learned and how individuals react to situations and determine what is sought in life. The entrepreneurial attitude is the tendency to react adequately in responding to the risks that will be faced in business. Moreover, Gedik et al. (2015) viewed individuals who show a positive attitude towards entrepreneurship, are more likely to act as an entrepreneur and believe that entrepreneurship is not just a method of survival but a way to achieve self-actualization. Based on the previous theoretical studies and previous research, this study tests the following hypotheses.

H5:   Entrepreneurial attitude influences students' entrepreneurial intention;
H6:   Entrepreneurial attitude mediates the impact of entrepreneurship education on students' entrepreneurial intention.

3. Research objective and methodology

3.1 Empirical Study Design

The study design applied in this research was a survey method with a quantitative approach. The benefit of adopting this approach gains a detailed understanding of how entrepreneurial education, entrepreneurial attitude, and self-efficacy influence students' intention of being entrepreneurs (see figure 1). This study used a convenience random sampling technique to collect the information of students in several state universities in Indonesia, including Universitas Negeri Malang, Universitas Negeri Jakarta and Universitas Negeri Semarang. The fundamental reason is that those universities represent each region, Universitas Negeri Malang (East Java), Universitas Negeri Semarang (Central Java), and Universitas Negeri Jakarta (West Java). This study was conducted for about two months, from January to February. The participants of this study were students in the second and third-year study who enrolled in the course of entrepreneurship and education and actively participated in programs of entrepreneurship. The leading researcher distributed 300 questionnaires, and 290 were returned, a response rate of 96.7 per cent. The majority respondent of this study was female by approximately 65 per cent, which reflected a higher proportion than male.
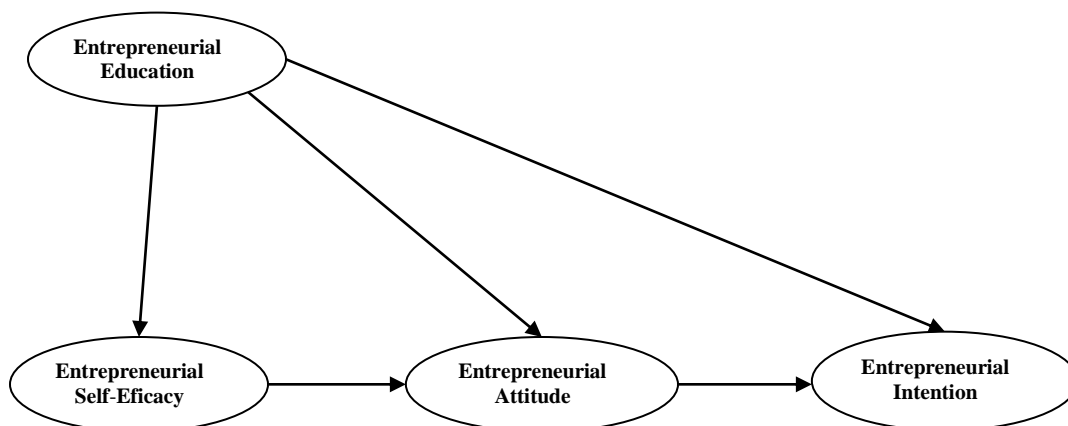
Figure 1. Theoretical Framework

Source: authors (2020)

3.2 Measurement and Data Analysis

The survey questionnaires used to collect information about entrepreneurial education (EE) were adapted from Souitaris et al. (2007), and Denanyoh et al. (2015). Besides, the entrepreneurial intention (EI) was measured by eight items instruments adapting from Zhao et al. (2005); Kolvereid and Isaksen (2006); Linan & Chen (2009). Meanwhile, to measure entrepreneurial self-efficacy (ES), we adapted 14 items developed by Ferreira et al. (2017); Zhao et al. (2005). Lastly, entrepreneurial attitude (AE) was measured by nine items of instruments developing by Yang (2013); Linan and Chen (2009). This study used a 5-point Likert scale in an attempt to gauge responses comprehensively.

This study engaged two stages of data analysis: exploratory factor analysis and confirmatory factor analysis. The initial test is aimed at validating, exploration dimensions, and maintaining strong indicators by using SPSS version18 (Allen & Bennett, 2010). A construct is said to be reliable if it has an alpha Cronbach (α) score equal to or higher than 0.6 (Hair et al., 2006). The next test was the confirmatory factor analysis (CFA) AMOS version 18.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

The model tested needs to satisfy several criteria and a cut-off value, including p-value (probability) > 0.5 to obtain a fit model (Schermelleh-Engel et al., 2003). Furthermore, CMIN / DF values <2 (Tabachnick & Fidell, 2007), CFI> 0.95 (Hu & Bentler, 1999), and RMSEA ≤ 0.05 (Hu & Bentler, 1999).

4. Results and Discussion
4.1 Resuts

Based on the initial test using exploratory factor analysis, it is known that from a total of 43 factors, including entrepreneurship education (12), entrepreneurial intention (8), entrepreneurial self-efficacy (14), and entrepreneurial attitude (9). Each variable has a loading factor of 0.621 to 0.917, and a Cronbach's alpha between 0.678 to 0.906. Moreover, based on SEM calculation results to check the theoretical framework and fitted models, a probability score of 0.073 is obtained, a CMIN / DF score of 1.324, a CFI score of 0.971, an FMIN score of 0.202 and an RMSEA score of 0.034.
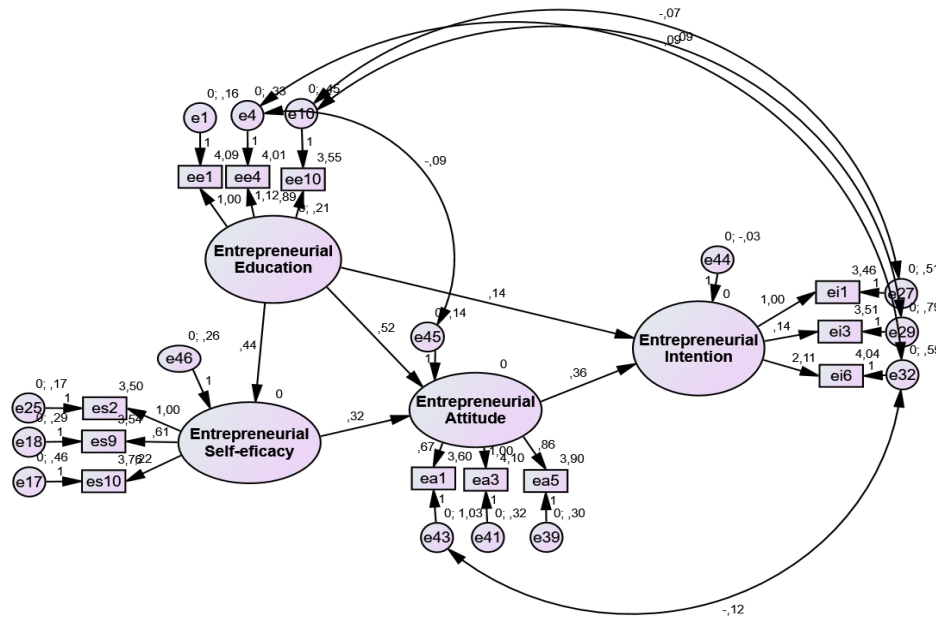
Figure 2. Results of the Structural Equation Research Model

Source: authors (2020)

Table 1. Result Summary of Hypotheses testing

				Estimate	*S.E.*	*C.R.*	*P*	**Result**
H₁	EE	→	ES	0.438	0.106	4.131	***	Significant
H₂	EE	→	EA	0.520	0.128	4.054	***	Significant
H₃	EE	→	EI	0.144	0.080	1.795	0.073	Insignificant
H₄	ES	→	EA	0.322	0.105	3.067	0.002	Significant
H₅	EA	→	EI	0.358	0.102	3.515	***	Significant
H₆	EE→ EA→ EI = b score 1.601							Insignificant

Source: authors (2020)

Note: EE = entrepreneurial education; ES = entrepreneurial self-efficacy; EA = entrepreneurial attitude; EI = entrepreneurial intention

Table 1 informs the summary of the hypothesis testing between variables. In general, the variables tested were satisfied with the model. In more detail, H_1, H_2, H_4, and H_5 were significant, with the C.R score is 4.131, 4.054, 3.067, and 3.515, respectively. These results, according to Hair et al. (2006), the C.R value of each of these hypotheses is significant because of $\pm$ 1.96. In contrast, H_3 and H_6 were not significant because of the C.R value of 1.795 and 1.601, respectively.

4.2 Discussion

Based on the previous analysis, this study has successfully addressed the six hypotheses proposed. The result of this study is relevant to the previous study by Fayolle and Gailly (2015); Laviolette (2012); Sánchez (2013); Von Graevenitz (2010). Indeed, the finding of this study agreed with previous papers in Indonesia context by Purwana and Suhud (2017); Saptono and Wibowo et al. (2018). The discovery of the study confirms the importance of entrepreneurship education. In order to improve students' self-efficacy, entrepreneurship education does not only cover at the theory of entrepreneurship, but also the practice of how to become an entrepreneur. The universities should hold various seminars related to entrepreneurship, by presenting practitioners and alumni who are already successful entrepreneurs. Their best practice will inspire students, as well as foster their self-efficacy so that the entrepreneurial intention is more definite. The practice of entrepreneurship should cooperate with various government and private agencies, so students increasingly understand how to build business relationships/business networks, market products, and find additional capital for businesses.

The second set question aims to understand the relationship between entrepreneurship education and entrepreneurial attitude. This result corroborates the findings of a great deal of the previous work by the Asia region (Bae et al., 2014; Ozaralli & Rivenburgh: 2016; Peng, Lu, & Kang, 2012). Also, this finding supports several prior studies, which conducted in Indonesia by Saptono and Wibowo (2018); Wibowo et al. (2018). Indeed, Keat et al. (2011) mentioned that the primary goal of entrepreneurship education is to change the views, behaviours, attitudes and intentions of students to understand entrepreneurship, have an entrepreneurial mindset, and later become successful entrepreneurs building businesses. Similarly, Sizong et al. (2008) also argue that entrepreneurship education significantly influences a person's attitude to be an entrepreneur. The majority of studies found that entrepreneurship education plays an essential role in building student entrepreneurial attitudes. Lee and Wong (2004) in their study findings reinforce Ajzen's (1991, 2002) with the theory of planned behaviour (TPB). Keat et al. (2011) asserted that the primary goal of entrepreneurship education is to change the views, behaviour and interests of students. Hence, they understand about entrepreneurship, and have an entrepreneurial mindset and later become successful entrepreneurs who build new businesses so they can open new job opportunities. Additionally, student attitudes can be improved by entrepreneurship education, increasing the practice of entrepreneurship (George & Bock, 2011; Souitaris et al., 2007). Through practice, entrepreneurship education enables students to have a lot of knowledge and practice it directly. Such an educational model will further strengthen the entrepreneurial attitudes of students while increasing their entrepreneurial intentions (Wu & Wu, 2008).

However, another finding of this study demonstrated that entrepreneurial education does not impact students' entrepreneurial intentions. This finding is in opposite with antecedent studies in Europe and Asia countries (Maresch et al., 2016; Barba-Sánchez & Atienza-Sahuquillo, 2018; Fayolle, 2015; Sánchez, 2011; Souitaris et al., 2007; Zhang et al., 2014) which found that entrepreneurship education influences entrepreneurial intention. However, our findings are relevant to the data from Statistics Indonesia (2019), which stated that the number of unemployed in Indonesia is 5.28 per cent, with the highest number contributed by universities. It implies that entrepreneurship education from elementary to tertiary levels has not been effective in growing student

entrepreneurial intentions. Therefore, universities in Indonesia need to revitalize the implementation of entrepreneurship education. Moreover, the university's efforts to grow entrepreneurship require a comprehensive entrepreneur education model that includes targets, learners, content, methods and evaluation by placing targets as a central component (Muwarni, 2016).

Entrepreneurial self-efficacy has an impact on students' entrepreneurial attitude. This study supports evidence from previous observations by Ayodele (2013); Guzmán-Alfonso and Guzmán-Cuevas (2012); Samydevan (2015); Ferreira et al. (2017), which states that the TPB component influences entrepreneurial attitude and entrepreneurial intention, where one component of TPB is self-efficacy. However, this outcome is contrary to that of Ogunleye and Osagu (2014), that remarked self-efficacy does not significantly influence entrepreneurial attitude and entrepreneurial intention. Entrepreneurial self-efficacy contributes to entrepreneurial attitudes. Our findings are relevant to Bandura (1989), who mentioned that self-efficacy can successfully carry out the desired behaviour, has a robust link with entrepreneurial attitudes and intentions. This finding is reinforced by and Conner et al. (2011) which states that self-efficacy correlates very strongly to one's intentions and attitudes.

The fifth question in this study sought to determine the influence of entrepreneurial attitude toward students' entrepreneurial intention. This result is in accord with recent studies by Ambad and Damit (2016); Lüthje and Franke (2003); Ozaralli and Rivenburgh (2016); Turker and Selcuk (2009); Yang (2013) indicating that the entrepreneurial attitude has an impact on intention being entrepreneur. Indeed, this finding agrees with prior studies by Utami (2017), which stated that entrepreneurial intention is influenced by entrepreneurial attitude, subjective norms, and intentional behaviour control. Gallyn and Waspada (2012) stated that the variable attitude of entrepreneurial students has a positive influence on entrepreneurial intentions. Indeed, Keat et al. (2011), entrepreneurship education became a compelling scenario in shaping entrepreneurial attitudes. Because, the main objective of entrepreneurship education is to change the views, attitudes and interests of students to understand about entrepreneurship, and have an entrepreneurial mindset and later become successful entrepreneurs who build new businesses so they can open new job opportunities. This is relevant to the findings of Sizong et al. (2008) that entrepreneurship education significantly influences a person's attitude to be an entrepreneur, while entrepreneurial attitudes significantly influence entrepreneurial intentions.

The last question in this research was intended to understand the role of entrepreneurial attitude. For this finding, entrepreneurial attitude failed in mediating the impact of entrepreneurial education and students' entrepreneurial intention. This finding is contrary to previous studies which have suggested Lüthje and Franke (2003); Ozaralli and Rivenburgh (2016); Von Graevenitz et al. (2010); Yang (2013) and Zhang et al. (2014) that entrepreneurial attitude as a component of TPB mediates the effect of entrepreneurial education on entrepreneurial intention. Therefore, it can be stated that the implementation of entrepreneurial education in Indonesia has not been effective in influencing both directly and indirectly on entrepreneurial intention. This indicates that entrepreneurship education in a number of universities in Indonesia has not been effective in shaping attitudes and intentions. The data from Statistics Indonesia (2019) states that the majority of tertiary education graduates in Indonesia are afraid to take risks and tend to choose to become a private employee, civil servant, or state-owned company employee as their career choice. These conditions indicate that the intention to become an entrepreneur after graduating into a bachelor becomes a low-level entrepreneur. A practical step in overcoming this phenomenon is to revitalize entrepreneurial education to be more comprehensive: covering targets, learners, content, methods and evaluations by placing targets as central components. Entrepreneurship education must be an entrepreneurial education, where principles and methodologies are applied towards the formation of life skills for students through an integrated curriculum developed at the university. This is important considering that

entrepreneurship education obtained during college will be the essential capital for students to start and build a new business.

Conclusions

The present study aims to examine the relationship between variables, including entrepreneurial education, self-efficacy, entrepreneurial attitude, and intention being entrepreneurs. This investigation confirms four hypotheses and rejects the two hypotheses proposed. In more detail, entrepreneurship education successfully influences entrepreneurial self-efficacy and students' attitudes toward entrepreneurship. However, it failed in promoting students' intention to being an entrepreneur. On the other hand, entrepreneurial self-efficacy has an impact on entrepreneurial attitude, while entrepreneurial attitude does not influence students' entrepreneurial intentions. Lastly, from this study, it showed that entrepreneurial attitude insufficient in mediating entrepreneurship education and intention being entrepreneurs.

Taken together, these results suggest that universities need to design and implement various activities to encourage lecturers to apply a variety of creative and innovative learning methods and models, providing facilities and infrastructure to support entrepreneurial activities to create an entrepreneurial attitude and entrepreneurial intention. Furthermore, entrepreneurship education must also be revitalized, especially the curriculum, strategies, methods, facilities, and infrastructure, as well as the learning environment. This is so that entrepreneurship education can effectively influence student entrepreneurial intention. The most important limitation lies in the fact that the data was collected in three state universities in Indonesia, which the findings cannot be generalized to represent real conditions in all universities. The suggestion for further studies, it can develop a study with a broader area, for example, non-educational public universities with more complex data obtained and can be used as a basis for stakeholders in implementing policies related to increasing the number of entrepreneurs in Indonesia.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, *50*(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Allen, P., Bennett, K., & King, J. (2010). *PASW statistics by SPSS: A practical guide, version 18.0*. National Library of Australia.

Ambad, S. N. A., & Damit, D. H. D. A. (2016). Determinants of entrepreneurial intention among undergraduate students in Malaysia. *Procedia Economics and Finance*, *37*, 108-114. https://doi.org/10.1016/S2212-5671(16)30100-9

Autio, E., H. Keeley, R., Klofsten, M., GC Parker, G., & Hay, M. (2001). Entrepreneurial intention among students in Scandinavia and in the USA. *Enterprise and Innovation Management Studies*, *2*(2), 145-160. https://doi.org/10.1080/14632440110094632

Ayodele, K. O. (2013). Demographics, entrepreneurial self-efficacy and locus of control as determinants of adolescents' entrepreneurial intention in Ogun state, Nigeria. *European Journal of Business and Social Sciences*, *1*(12), 59-67. Retrieved April 14, 2020, from https://publication.babcock.edu.ng/asset/docs/publications/EDFO/9454/3281.pdf

Bandura, A. (1989). Human agency in social cognitive theory. *American psychologist, 44*(9), 1175. https://doi.org/10.1037/0003-066X.44.9.1175

Bae, T. J., Qian, S., Miao, C., & Fiet, J. O. (2014). The relationship between entrepreneurship education and entrepreneurial intentions: A meta–analytic review. *Entrepreneurship Theory and Practice*, *38*(2), 217-254. https://doi.org/10.1111/etap.12095

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Barba-Sánchez, V., & Atienza-Sahuquillo, C. (2018). Entrepreneurial intention among engineering students: The role of entrepreneurship education. *European Research on Management and Business Economics*, *24*(1), 53-61. https://doi.org/10.1016/j.iedeen.2017.04.001

Conner, M., Rhodes, R. E., Morris, B., McEachan, R., & Lawton, R. (2011). Changing exercise through targeting affective or cognitive attitudes. *Psychology and Health, 26*(2), 133-149. https://doi.org/10.1080/08870446.2011.531570

Denanyoh, R., Adjei, K., & Nyemekye, G. E. (2015). Factors that impact on entrepreneurial intention of tertiary students in Ghana. *International Journal of Business and Social Research*, *5*(3), 19-29. Retrieved April 14, 2020, from https://www.thejournalofbusiness.org/index.php/site/article/view/693/506

Eryanto, H., Swaramarinda, D. R., & Nurmalasari, D. (2019). Effectiveness of entrepreneurship practice program: Using cipp program evaluation. *Journal of Entrepreneurship Education, 22*(1), 1-10.

Fayolle, A., & Gailly, B. (2015). The impact of entrepreneurship education on entrepreneurial attitudes and intention: Hysteresis and persistence. *Journal of Small Business Management*, *53*(1), 75-93. https://doi.org/10.1111/jsbm.12065

Ferreira, A. D. S. M., Loiola, E., & Gondim, S. M. G. (2017). Individual and contextual predictors of entrepreneurial intention among undergraduates: a literature review. *Cadernos Ebape. Br*, *15*(2). https://doi.org/10.1590/1679-395159595

Fishbein., & Ajzen. (1975). *Belief, Attitude, Intentions and Behavior: an introduction to theory and research*. California: Addison-Wesley Publishing Company, Inc. Retrieved April 14, 2020, from https://people.umass.edu/aizen/f&a1975.html

Gallyn, D. M., & Waspada, I. (2012). Faktor-Faktor yang Mempengaruhi Minat Berwirausaha Mahasiswa Universitas Pendidikan Indonesia. *Jurnal Pendidikan Islami, 1*(2), 1-14.

Gautam, M. K., & Singh, S. K. (2015). Entrepreneurship education: concept, characteristics and implications for teacher education. *An International Journal of Education*, *5*(1), 21-35. Retrieved April 14, 2020, from www.researchgate.net

Gedik, Ş., Miman, M., & Kesici, M. S. (2015). Characteristics and attitudes of entrepreneurs towards entrepreneurship. *Procedia-Social and Behavioral Sciences*, *195*, 1087-1096. https://doi.org/10.1016/j.sbspro.2015.06.153

Gerba, D. T. (2012). Impact of entrepreneurship education on entrepreneurial intentions of business and engineering students in Ethiopia. *Journal of Economic and Management Studies*, *3*(2), 258-277. https://doi.org/10.1108/20400701211265036

Guzmán-Alfonso, C., & Guzmán-Cuevas, J. (2012). Entrepreneurial intention models as applied to Latin America. *Journal of Organizational Change Management*, *25*(5), 721-735. https://doi.org/10.1108/09534811211254608

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis*. Upper Saddle River, NJ: Prentice hall.

Hoz-Rosales, B., Camacho Ballesta, J. A., & Tamayo Torres, I. (2019). Effects of innovative entrepreneurship and the information society on social progress: an international analysis. *Entrepreneurship and Sustainability Issues, 7*(2), 782-813. http://doi.org/10.9770/jesi.2019.7.2(1)

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal*, *6*(1), 1-55. https://doi.org/10.1080/10705519909540118

Keat, O. Y., Selvarajah, C., & Meyer, D. (2011). Inclination towards entrepreneurship among university students: An empirical study of Malaysian university students. *International Journal of Business and Social Science*, *2*(4), 206-220. Retrieved April 14, 2020, from http://www.ijbssnet.com/journals/Vol._2_No._4%3B_March_2011/24.pdf

Kolvereid, L., & Isaksen, E. (2006). New business start-up and subsequent entry into self-employment. *Journal of Business Venturing*, 21(6), 866–885. https://doi.org/10.1016/j.jbusvent.2005.06.008

Kourilsky, M. L., & Walstad, W. B. (1998). Entrepreneurship and female youth: knowledge, attitude, gender differences, and educational practices. *Journal of Business Venturing, 13*(1), 77-88. https://doi.org/10.1016/S0883-9026(97)00032-3

Laviolette, E. M., Lefebvre, M. R., & Brunel, O. (2012). The impact of story bound entrepreneurial role models on self-efficacy and entrepreneurial intention. *International Journal of Entrepreneurial Behavior & Research*, *18*(6), 720-742. https://doi.org/10.1108/13552551211268148.

Lee, L., & Wong, P. K. (2003). Attitude towards entrepreneurship education and new venture creation. *Journal of Enterprising Culture, 11*(4), 339-357. https://doi.org/10.1142/S0218495803000111

Liñán, F., & Chen, Y. W. (2009). Development and cross–cultural application of a specific instrument to measure entrepreneurial intentions. *Entrepreneurship Theory and Practice*, *33*(3), 593-617. https://doi.org/10.1111/j.1540-6520.2009.00318.x

Lüthje, C., & Franke, N. (2003). The 'making'of an entrepreneur: testing a model of entrepreneurial intent among engineering students at MIT. *R&D Management*, *33*(2), 135-147. https://doi.org/10.1111/1467-9310.00288

Maresch, D., Harms, R., Kailer, N., & Wimmer-Wurm, B. (2016). The impact of entrepreneurship education on the entrepreneurial intention of students in science and engineering versus business studies university programs. *Technological Forecasting and Social Change*, *104*, 172-179. https://doi.org/10.1016/j.techfore.2015.11.006

Moriano, J. A., Gorgievski, M., Laguna, M., Stephan, U., & Zarafshani, K. (2012). A cross-cultural approach to understanding entrepreneurial intention. *Journal of Career Development*, *39*(2), 162-185. https://doi.org/10.1177%2F0894845310384481

Ogunleye, A. J., & Osagu, J. C. (2014). Self-efficacy, tolerance for ambiguity and need for achievement as predictors of entrepreneurial orientation among entrepreneurs in Ekiti state, Nigeria. *European Journal of Business and Management*, *6*(17), 240-250. Retrieved April 14, 2020, from https://www.iiste.org/Journals/index.php/EJBM/article/view/13634/13860

Ozaralli, N., & Rivenburgh, N. K. (2016). Entrepreneurial intention: antecedents to entrepreneurial behavior in the USA and Turkey. *Journal of Global Entrepreneurship Research*, *6*(1), 1-32. https://doi.org/10.1186/s40497-016-0047-x

Patricia, P., & Silangen, C. (2016). The effect of entrepreneurship education on entrepreneurial intention in Indonesia. *DeReMa (Development Research of Management): Jurnal Manajemen*, *11*(1), 67-86. http://dx.doi.org/10.19166/derema.v11i1.184

Peng, Z., Lu, G., & Kang, H. (2013). Entrepreneurial intentions and its influencing factors: A survey of the university students in Xi'an China. *Creative Education*, *3*(8), 95-100. https://doi.org/10.4236/ce.2012.38B021.

Purwana, D., & Suhud, U. (2017). Entrepreneurship Education and Taking / Receiving & Giving (TRG) Motivationson Entrepreneurial Intention: Do Vocational School Students Need an Entrepreneurial Motivator ? *International Journal of Applied Business and Economic Research*, *15*(22), 349-363. https://doi.org/10.5861/ijrsm.2015.1004

Rauch, A., & Hulsink, W. (2015). Putting entrepreneurship education where the intention to act lies: An investigation into the impact of entrepreneurship education on entrepreneurial behavior. *Academy of Management Learning & Education*, *14*(2), 187-204. Retrieved April 14, 2020, from https://www.effectuation.org/wp-content/uploads/2017/06/Putting-Entrepreneurship-Educations-where-the-Intention-to-Act-Lies-1.pdf

Rosmiati, R., Junias, D. T. S., & Munawar, M. (2015). Sikap, motivasi, dan minat berwirausaha mahasiswa. *Jurnal Manajemen dan Kewirausahaan*, *17*(1), 21-30. https://doi.org/10.9744/jmk.17.1.21-30

Samydevan, V., Piaralal, S., Othman, A. K., & Osman, Z. (2015). Impact of psychological traits, entrepreneurial education and culture in determining entrepreneurial intention among pre-university students in Malaysia. *American Journal of Economics*, *5*(2), 163-167. https://doi.org/10.5923/c.economics.201501.19

Sánchez, J. C. (2013). The impact of an entrepreneurship education program on entrepreneurial competencies and intention. *Journal of small business management*, *51*(3), 447-465. https://doi.org/10.1111/jsbm.12025.

Saptono, A., & Wibowo, A. (2018). Do learning environment and self-efficacy impact on student's entrepreneurial attitude?. *International Journal of Entrepreneurship*, *22*(4), 1-11. Retrieved April 14, 2020, from https://www.abacademies.org/articles/Do-learning-environment-self-efficacy-impact-on-studes-entrepreneurial-attitude-1939-4675-22-4-220.pdf

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Saptono, A., Purwana, D., Wibowo, A., Wibowo, S. F., Mukhtar, S., Yanto, H., … Kusumajanto, D. D. (2019). Assessing the university students' entrepreneurial intention: Entrepreneurial education and creativity. *Humanities and Social Sciences Reviews*, *7*(1), 505–514. https://doi.org/10.18510/hssr.2019.7158

Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online*, *8*(2), 23-74. Retrieved April 14, 2020, from http://www.stats.ox.ac.uk/~snijders/mpr_Schermelleh.pdf

Shapero, A., & Sokol, L. (1982). The social dimensions of entrepreneurship. *Encyclopedia of entrepreneurship*, 72-90. Retrieved April 14, 2020, from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1497759

Souitaris, V., Zerbinati, S., & Al-Laham, A. (2007). Do entrepreneurship programmes raise entrepreneurial intention of science and engineering students? The effect of learning, inspiration and resources. *Journal of Business venturing*, *22*(4), 566-591. https://doi.org/10.1016/j.jbusvent.2006.05.002

Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2007). *Using multivariate statistics* (Vol. 5). Boston, MA: Pearson.

Tong, X. F., Tong, D. Y. K., & Loy, L. C. (2011). Factors influencing entrepreneurial intention among university students. *International Journal of Social Sciences and Humanity Studies*, *3*(1), 487-496. Retrieved April 14, 2020, from http://www.sobiad.org/ejournals/journal_ijss/arhieves/2011_1/xue_fa_tong.pdf

Tung, D. T., Hung, N. T., Phuong, N. T. C., Loan, N. T. T., & Chong, S. C. (2020). Enterprise development from students: The case of universities in Vietnam and the Philippines. *International Journal of Management Education*, *18*(1), 100333. https://doi.org/10.1016/j.ijme.2019.100333

Turker, D., & Selcuk, S. S. (2009). Which factors affect entrepreneurial intention of university students?. *Journal of European Industrial Training*, *33*(2), 142-159. https://doi.org/10.1108/03090590910939049.

Turkina, E., & Thai, M. T. T. (2013). Social capital, networks, trust and immigrant entrepreneurship: A cross-country analysis. *Journal of Enterprising Communities: People and Places in the Global Economy, 7*(2), 108-124 https://doi.org/10.1108/17506201311325779

Uddin, M. R., & Bose, T. K. (2012). Determinants of entrepreneurial intention of business students in Bangladesh. *International Journal of Business and Management*, *7*(24), 128-137. http://dx.doi.org/10.5539/ijbm.v7n24p128.

Utami, C. W. (2017). Attitude, subjective norms, perceived behaviour, entrepreneurship education and self-efficacy towards entrepreneurial intention university student in Indonesia. *European Research Studies Journal*, *20*(24), 475-495. Retrieved April 14, 2020, from https://ideas.repec.org/a/ers/journl/vxxy2017i2ap475-495.html

Von Graevenitz, G., Harhoff, D., & Weber, R. (2010). The effects of entrepreneurship education. *Journal of Economic Behavior & Organization*, *76*(1), 90-112. https://doi.org/10.1016/j.jebo.2010.02.015

Walter, S. G., & Block, J. H. (2016). Outcomes of entrepreneurship education: An institutional perspective. *Journal of Business Venturing*, *31*(2), 216-233. https://doi.org/10.1016/j.jbusvent.2015.10.003

Wang, C. K., & Wong, P. K. (2004). Entrepreneurial interest of university students in Singapore. *Technovation*, *24*(2), 163-172. https://doi.org/10.1016/S0166-4972(02)00016-0.

Wibowo, A., Saptono, A., & Suparno. (2018). Does teachers' creativity impact on vocational students' entrepreneurial intention? *Journal of Entrepreneurship Education*, *21*(3), 1-12. Retrieved April 14, 2020, from https://www.abacademies.org/articles/does-teachers39-creativity-impact-on-vocational-students39-entrepreneurial-intention-7351.html

Wu, S., & Wu, L. (2008). The impact of higher education on entrepreneurial intentions of university students in China. *Journal of Small Business and Enterprise Development, 15*(4), 752-774. https://doi.org/10.1108/14626000810917843

Yang, J. (2013). The theory of planned behavior and prediction of entrepreneurial intention among Chinese undergraduates. *Social Behavior and Personality: An International Journal*, *41*(3), 367-376. https://doi.org/10.2224/sbp.2013.41.3.367

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Zhang, Y., Duysters, G., & Cloodt, M. (2014). The role of entrepreneurship education as a predictor of university students' entrepreneurial intention. *International Entrepreneurship and Management Journal*, *10*(3), 623-641. https://doi.org/10.1007/s11365-012-0246-z

Zhao, H., Seibert, S. E., & Hills, G. E. (2005). The mediating role of self-efficacy in the development of entrepreneurial intentions. *Journal of applied psychology*, *90*(6), 1265-1272. https://doi.org/10.1037/0021-9010.90.6.1265

Acknowledgements

Djoko Dwi KUSUMOJANTO Djoko Dwi Kusumojanto is associate professor of entrepreneurship at Faculty of Economics Universitas Negeri Malang, Indonesia. He obtained his Ph.D in economic education from Universitas Negeri Malang. His concerned in entrepreneurship and entrepreneurship education. He has over 20 years of teaching experience in Faculty of Economics Universitas Negeri Malang. He has taught courses related to entrepreneurship, management, and educational. Research interests: entrepreneurship education; entrepreneurship; management.
ORCID ID: http://orcid.org/0000-0002-9630-2921

Bagus Shandy NARMADITYA is lecturer at Faculty of Economics Universitas Negeri Malang, Indonesia. He obtained his master in economic education from Universitas Negeri Malang. His concerned as editor and reviewer in several social sciences journal and focused on economic welfare and economic education. He participated in various international conference such as in Japan, Thailand, Vietnam and Indonesia. He also enrolled in the GSE summer school of economics in Barcelona, Spain. Research interests: entrepreneurship, entrepreneurship education; entrepreneurship; economics; economics education.
ORCID ID: http://orcid.org/0000-0002-4019-8723

Agus WIBOWO is assistant professor of entrepreneurship at Faculty of Economics Universitas Negeri Jakarta, Indonesia. He is doctoral candidate in Economic Education, Universitas Negeri Malang. His concerned as editor and reviewer in several social sciences journal and focused on entrepreneurship, entrepreneurship education, and economic education. He has taught courses related to entrepreneurship, educational management, and educational. Research interests: entrepreneurship education; entrepreneurship; management.
ORCID ID: http://orcid.org/0000-0003-0051-1743

AN INTEGRATIVE STUDY OF THE IMPLICATIONS OF THE RISE OF COWORKING SPACES IN SMART CITIES

Fang Zhao [1], Catherine Prentice [2], Joseph Wallis [3], Arvind Patel [4], Marie-France Waxin [5]

[1] Staffordshire University, Stoke-on-Trent, ST4 2DF, United Kingdom
[2] Griffith University, Brisbane, Queensland, Australia
[3] American University of Ras Al Khaimah, RAK, United Arab Emirates
[4] The University of the South Pacific, Suva, Fiji
[5] American University of Sharjah, Sharjah, United Arab Emirates

E-mails:[1] fang.zhao@staffs.ac.uk; [2]cathyjournalarticles@gmail.com; [3] joseph.wallis@aurak.ac.ae; [4] Arvind.Patel@usp.ac.fj; [5] mwaxin@aus.edu

Abstract. Coworking practices have proliferated around the world being embraced not only by remote workers, start-up employees and freelancers but also by larger organizations. Coworking spaces in public libraries, business districts and other urban spaces, herald profound changes for the way workspaces are used in cities. The study takes an integrative approach to investigate the economic and socio-cultural implications of coworking trend for smart cities, their ecosystems and the use of urban public spaces. The study examines these issues by studying motivations and challenges of providers and users of coworking spaces. Thirty coworking spaces in urban areas across Australia were studied and thirty-four semi-structured interviews were conducted with both providers and users of the coworking spaces. The findings suggest that coworking spaces play an important role in building communities and developing social and cultural ties. From urban space and environmental perspectives, coworking spaces are likely to contribute to urban mobility and sustainability. From an urban economic perspective, coworking spaces provide a collaborative environment and often a breeding ground for entrepreneurship. Entrepreneurship is one of the most salient themes in the coworking spaces as found in this study. These findings will inform urban policy makers and help them better understand and tap into the source of civic entrepreneurship derived from coworking spaces.

Keywords: coworking spaces; smart cities; ecosystems; entrepreneurship; urban planning; public spaces

1. Introduction

Public spaces in urban areas as part of urban planning and urban governance have attracted extensive research interest over the last 20 years from various perspectives (Ravazzoli and Torricelli, 2017). For instance, architects and urban planners are interested in public physical space and people; urban sociologists study the role of public spaces in building social relations; and political scientists look into the use of public space for civil engagement and democracy. From a socio-cultural perspective, public spaces are considered places for social interaction, playing a central role in the creation of inclusive communities (Costamagna et al., 2019). Coworking spaces have been defined as 'shared workspaces utilized by different sorts of knowledge professionals, mostly freelancers, working in various degrees of specialization in the vast domain of the knowledge industry' (Gandini, 2015, p. 194). They can be referred to as a type of public space since they are 'publicly accessible places where people go for group or individual activities' (Carr et al., 1992, p. 50).

Although the concept of contemporary coworking originated in 2005 in San Francisco, it is only in the past few years that co-working spaces have become a striking and visible feature of metropolitan (Gandini, 2015; Nathan, 2017). Coworking practices have proliferated around the globe being embraced not only by remote workers, start-up employees and freelancers but also by larger organizations. A recent estimation shows that there are 14,411 coworking spaces in the world today with the number predicted to rise to 5.1 million by 2022 (Amador, 2018). Coworking spaces, according to Bounchen et al. (2018), generally have four distinct archetypes: the corporate, the open corporate, the consultancy, and the independent coworking spaces:
- Corporate coworking spaces are created by firms for their employees as a novel avenue for creativity, innovation and intrapreneurship;
- Open corporate coworking spaces are open both to internal and external users to encourage innovation and creativity among internal users and between internal and external users;
- Consultancy coworking spaces are usually created by consulting firms to organize and manage projects, relationships and networks with externals; and
- Independent coworking spaces offer membership to the public. They are mostly located in public libraries, business districts and other urban spaces and are characteristically open for public use.

For the purpose of this study, we refer to coworking spaces as urban public spaces which are aligned with ecosystem initiatives for the development of smart cities. There is a growing body of empirical evidence that some city governments support the growth of coworking spaces through public funding and/or offering public spaces such as city council buildings and public libraries (Mariotti et al. 2017). This reflects the importance of coworking spaces to urban governance and urban planning in those cities. Although co-working spaces have attracted considerable media and property market attentions (e.g. Cheung, 2018), research on co-working spaces is still developing as the trend grows. To the best of our knowledge, limited empirical research has been published to answer the important questions such as: what are (or could be) the economic and socio-cultural implications of co-working trend for smart cities, their ecosystems and the use of urban public space? How should urban policymakers react to the trend?

Smart cities are expected to be a driving force for innovation and entrepreneurship from an economic and business perspective (European Commission, 2019). However, smart cities can transcend the economic and corporate agenda to include social inclusion from cultural and social perspectives. The rise and growth of coworking spaces has brought the possibility of a new model of work in an environment of collaboration, openness and community where innovation and entrepreneurship thrive, and new fabrics of social culture develop. In this regard, an integrative approach is needed to study the rise of the coworking spaces and its implications for smart cities

planning and governance. This study seeks to address these important issues through a qualitative study of thirty co-working spaces. The findings of the study could have important implications for the planning of smart cities as well as contributing to the burgeoning literature on smart cities research.

The following section reviews the relevant literature on smart city and coworking space. Research questions are raised from this review. The methodology to address these research questions is then outlined. The findings are then presented, followed by a discussion of its research implications as well as the contributions and limitations of the study and directions for future research before we conclude the paper.

2. Literature Review

Smart cities

The smart city movement started in the 1990s (Letaifa, 2015) and has recently gained momentum in urban governments' planning in many countries at various levels – local, state and national (Albino et al., 2015). Research on smart cities often touches on four areas: the technological aspect (e.g. the technological infrastructure and support network for building smart cities); the socio-cultural aspect (e.g. citizen engagement); the political-institutional aspect (e.g. government support and policies); and the economic-business aspect (e.g. business models and profitability). It is generally agreed that the objective of smart cities is to enhance economic growth and social development through innovations in technology and heightened collaboration (Sarma and Sunny, 2017). However, some research also criticizes the concept of smart cities for its narrow epistemological perspective and its corporate agenda that primarily reflects the interests of multi-national consultancies and technology companies (Marvin et al. 2015; Tompson, 2017).

Research shows that smart cities rely on a smart city ecosystem to survive and thrive. Sarma and Sunny (2017, p.848) define a smart city ecosystem as a set of interconnected actors, such as agents (entrepreneurs), decision makers (e.g. policymakers and bureaucrats), framers (e.g. technology providers, supplier networks, and markets), and constituents (e.g. citizens, investors, and labour). We concur with this definition and argue that ecosystems go far beyond a diverse set of actors and networks. The smart city ecosystems should also include processes and systems, policies and governance that support smart city initiatives and development. Research indicates that a paradigm shift towards a more dynamic and open architecture is taking place in smart city governance (Mandeli, 2019). Cooperative governance and private and public partnerships are replacing traditional silo-based governance approaches. Citizens' involvement and community engagement in smart city development becomes an important aspect of discourse reflected in policy statements (European Commission, 2019; Trencher, 2019) and smart city strategies, and an area viewed as critical in smart city initiatives and research agendas (UNESCO 2019; Marek et al., 2017). Smart cities are about smart people. While smart technologies play a key role in making cities connected and digitalized, it is people who drive, create and take up technologies. Therefore, the success of smart cities lies in the creation and development of their people. Human and social capital are considered as the key pillars of the ecosystems, which smart city strategies seek to develop and nurture. Angelidou (2015) recommends that dedicated areas are needed within smart cites, where people can collaborate and engage in innovative activities that may lead to the development of human and social capital. Such areas are referred to coworking spaces.

Coworking space

Coworking practice has become a new model of workplaces in today's collaborative and sharing economy (Botsman and Rogers, 2011; Avdikos and Merkel, 2020). Many start-ups and some larger companies such as Woolworths, Accenture and LG Electronics have embraced the coworking space concept (Office Hub, 2018) because of the merits of collaborative working environment and the cost-effectiveness in terms of flexible leasing terms (Zhou, 2019). Public libraries are a popular form of coworking space. According to the president of American Library Association, many libraries in the US are being re-invented into modern community spaces, offering free coworking spaces for growing numbers of entrepreneurs, for whom they are better alternatives to coffee shops and a much cheaper option than hiring a desk in commercial coworking spaces like WeWork (Krueger, 2019).

Research on coworking spaces from both the perspectives of academic and practitioners has flourished over the past decade (Gandini, 2015). Based on a relational constructionist lens, Garrett et al. (2017) explore how members of a coworking space work together to co-construct and sustain a sense of community through their daily interactions. The study found that the sense of community was achieved through three overlapping interactions – endorsing, encountering, and engaging among members working in the coworking spaces.

Coworking spaces have also the benefits of work flexibility, serendipitous encounters with like-minded people, idea generation and sharing, business networking, and a relief from loneliness of working from home (e.g. King. 2017; Garrett et al., 2017). Mariotti et al's (2017) study investigates the location patterns of coworking spaces through a case study of Milan, Italy and assesses their effects on the urban context. The findings suggest that the participation of workers in coworking spaces contributes to local community initiatives, urban revitalization trends, and micro-scale physical transformations. The study of Bueno et al (2017) suggests that coworking spaces are likely to increase productivity through offering collaborative networks and a dynamic ecosystem to foster innovation.

However, critiques of coworking spaces question a somewhat self-proclaimed and often overenthusiastic evaluation of positive outcomes from coworking spaces (Gandini and Cossu, 2019). From an economic and business perspective, the study of Moriset (2014) points out the risks of possible 'coworking bubbles' driven by the profitability concerns. The study of Bounchen et al. (2018) analyses the cooperative tensions in value creation and appropriation in various types of coworking spaces.

The mixed reactions to the concept and practices of coworking spaces warrant better understanding of the trend. Moreover, what roles do coworking spaces play in smart city ecosystem in general and in entrepreneurship in particular. These questions remain largely underexplored in the current literature of either smart cities or entrepreneurship. As pointed out by the study of Mariotti et al (2017), empirical evidence and critical analysis are limited about the role of coworking spaces in smart cities, their ecosystems and the use of urban public space. We seek to address the gap in an integrative way through investigating the actual and potential economic (in the form of entrepreneurship) and social-cultural impacts of coworking spaces on urban planning and their residents.

Linking coworking spaces to smart city ecosystems

Over the past decade, research on smart cities has grown exponentially and expanded to multidisciplinary fields, integrating a range of perspectives (Kummitha and Crutzen, 2017; Trencher, 2019). There has been over 200 percent increase in publication volume on smart cities since 2009 (Ojo et al. 2015). The extensive review of the literature on smart cities conducted by Meijer and Bolivar (2016) reveal three common foci that are dominant in extant smart city research, namely, technological focus, human resource focus and governance focus. An international comparative study found that from a leadership perspective, smart cities can be seen as digital government, a digital driver for economic growth, an open platform for digital socio-political innovation, and an open platform for the digital economy (Sancino and Hudson, 2020). For the purpose of this study, we take an integrative approach to the concept of smart cities and view and discuss it from economic, political, social and cultural perspectives.

From an integrative perspective, smart cities are built on a robust ecosystem which should include an innovation environment that nurtures and supports smart cities, including smart people, leadership, strategies and policies, human and social capital, an integrated IT system and a collaborative and open culture (Appio et al, 2019). For example, smart city programs are designed to provide open channels to engage citizens and stakeholders and solicit inputs on the viability of smart city solutions and services in real life contexts (Meijer and Bolívar, 2016). The collaboration among the cities' residents, businesses and public sector is seen as a source of new and effective knowledge production and as a precursor for the development of open knowledge and innovation ecosystems. The smart cities ecosystem is not simply about technology but about culture, people, strategy and governance (Mora et al., 2019).

In this study we seek to understand more about what role coworking spaces play in the context of smart city ecosystems, how they work, the purposes and motivations of running and using coworking spaces, the perceived and realized outcomes of the coworking spaces and the key issues and challenges facing both the supply and demand sides. Hence, this study addresses the following research questions:
   • What drives engagement with coworking places?
   • What are the issues and challenges of coworking places?

3. Methods

To answer the research questions, we followed a qualitative design, arguing that a qualitative methodology allowed us to develop an in-depth understanding of the experiences of both users and providers of the coworking spaces studied and the context in greater detail (Yin, 2011). In line with the qualitative design, we employed semi-structured interview method, which provided consistency of questioning across interviews while having the flexibility to explore areas of interest in greater depth.

Sample

We selected 30 coworking spaces in urban areas across Australia, namely, Perth, Sydney, Melbourne, Brisbane, Adelaide, Hobart, Darwin and Canberra to cover all the major cities in Australia. The selection of Australia for the case study was mainly for three reasons: (1) Australia has been one of the leading countries in smart city transformation (KPMG, 2019); (2) Australia embraces a strong growth in coworking spaces (Cheung, 2018), with coworking spaces having grown by 297 to 309 per cent between 2013 and 2017, and the recent forecast estimates

a tripling in coworking spaces by 2030 (Cheung, 2018); and (3) leading researchers have been intensively involved in smart city projects in Australia.

The key criteria for the selection of coworking spaces included: a wide range of urban locations, a minimum of one-year operation of coworking spaces to see some outcomes, and a mix of private and public ownerships. Another important selection criterion was that the coworking space must be open to the public as this study has been intended to inform evidence-based policies and strategies concerning the public use of urban spaces.

Data collection procedure

Primary and secondary data for this study was collected during a 6-month period between October 2017 and April 2018, mainly from three sources: (1) extensive research on the websites of every coworking space studied; (2) semi-structured interviews with both coworking spaces providers (owners and/or operators) and users; and (3) site visits to some coworking spaces in Perth. In addition, some of our team members spent several days working in some of the coworking spaces to get first-hand experience.

As described in the previous section, a total of thirty-four semi-structured interviews were conducted with both providers (10) and users (24) of the thirty coworking spaces studied between October 2017 and April 2018. The interviews were conducted either face-to-face or via Skype with the participants in the coworking spaces they were associated with. The interviews took between half an hour and one and a half hours, with the average being close to one hour. All the interviews were tape-recorded and transcribed for analysis. The primary objectives of the interviews were to find out the actual and potential impacts of coworking spaces on users and the challenges and issues the coworking spaces had been facing. From the findings we sought to answer research questions about the roles of coworking spaces in innovation ecosystems of smart cities in economic and socio-cultural terms as well as their implications for future urban planning and governance. Therefore, our interview questions centred around:
- Motivations for providers and users
- Key challenges for providers and users

To ensure a robust and fair representation of stakeholders, we selected participants purposively based on their involvement in coworking spaces, their job type, managerial position, and industry/business sectors. Contact details and some of the demographic information about the participants were found mainly on the company websites of coworking spaces and through contacts during our site visits. After approaching 45 prospective participants by email and telephone, and in person, 34 of them agreed to be interviewed.

Table 1. Summary of demographics of *participants* in the interviews (N=34)

Variable	Provider (N=10)	29%*	Variable	User (N=24)	71%*
Gender	Male	70	**Gender**	Male	67
	Female	30		Female	33
Age	25-40	30	**Age**	25-40	46
	41-59	60		41-55	29
	60+	10		56+	25
			Occupation	Freelancer	17
Position	Founder/owner	70		Entrepreneur	42
	Manager**	30		Remote worker	8
				Student	13
Industry	Government	20		Digital nomad	4
	University/ Tertiary Institution	40		Local workers	8
	Business Services	20		Other	8
	Resources	10	**Industry**	Resources	8
	IT	10		Business Services	21
				Retail	4
Education	Postgraduate	40		Creative	4
	1st Degree	20		IT	25
	Undergraduate/ Tertiary	20		Tourism and Hospitality	8
	Non-Tertiary	20		Education and Health	8
			Education	Postgraduate	17
				1st Degree	33
				Undergraduate/Tertiary	29
				Non-Tertiary	21

Note: * Figures are percentages of demographics. **Manager category does not include owner or founder.

Table 1 presents a summary of the demographics of the participants in our interviews. We interviewed two groups: 10 providers and 24 users in order to get a comprehensive view of coworking spaces studied. In terms of the gender of the participants, the majority among both providers and users are male. In terms of age group, most of the providers we interviewed aged between 41 and 59. By contrast, the users were youth, millennials, middle-aged, and retirees, with a majority aged between 25 and 40. Most of the providers (70%) were funders and owners with a range of industry backgrounds. We found that users' backgrounds were more diverse, covering various industries and professions. Among the users, the largest group (42%) were entrepreneurs, followed by self-employed freelancers (17%) who did not see themselves as either entrepreneurs or students (13%). Among the participants, a small number of remote workers were employed by non-local companies. The rest were local workers - employees of local companies, and digital nomads from overseas. The 'other' category included retirees and local residents who were not employed at the time of interview. Overall, the users interviewed corresponding largely with the member profiles of the coworking spaces studied.

Data analysis

We adopted the data analysis process of Miles and Huberman (1994) which involves three concurrent sub-processes: data reduction, data display, and the drawing of conclusions. The data reduction that we conducted included qualitative content analysis of website contents (secondary data) to understand the background of the co-working spaces studied and the primary data of transcripts and notes from interviews. A theme coding system (using theme as a coding unit) was employed in the data reduction process. Accordingly, the large amount of data was coded and categorized into key themes identified through the repeated reviewing and comparing of data (Minichiello et al. 1990). Appendix presents a snapshot of our data display and the key themes from the interviews.

4. Findings

Coworking space - location, size, user profiles, ownership and business models

Table 2 summarizes the key profiles of the 30 coworking spaces we studied. In terms of geographic location, the sample covers every capital city (i.e. 8 in total) in Australia. The majority (64%) of the coworking spaces were located in the capital city centres and 20% were located within a 10km radius of the capital city centres which were often the business and commercial centres of metropolitan suburbs. The geographic locations of the coworking spaces reflect users' preferences in selecting coworking spaces. As to the age of the coworking spaces studied, they ranged between 1 and 8 years as of 2018, with the majority (67%) being founded in and after 2015. This finding was consistent with the trend of rapid growth of coworking spaces not only in Australia but also worldwide (Merkel, 2019).

Table 2 Summary of the main profiles of the *coworking spaces* studied (N=30)

Location	Est. Year	Size	Member profile*	Ownership	Operating model
City centre = 64%	2010 < = 10%	15 < = 30%	Entrepreneur = 40%	Govt-owned = 10%	CWS only = 17%
Within 10km = 20%	2011-2014 = 23%	16-50 = 23%	Freelancer = 10%	University-owned =13%	CWS & service=83%
11km – 20km = 10%	2015> =67%	51-100 = 43%	Remote worker = 10%	NGO – owned = 3%	
21km+ = 6%		100> = 3%	Digital nomad = 5%	Privately-owned = 17%	
			Local employee = 10% Student = 15% Others**= 10%	Joint venture = 57%	

Legend: CWS = coworking spaces; Size = number of active members or users
Note: Member profile* is an estimated percentage of the active members' profiles of the 30 coworking spaces studied. Others** category refers to retirees, students, and local residents who do not fall into any of the other categories.

Table 2 shows that the size (i.e. number of the active members) of coworking spaces studied varied with the majority (43%) of them having more than 50 and up to 100 active members. We found that the size corresponded well with the age of the coworking space, namely, those that were well-established often had more members than those that were relatively more recently set up.

With respect to user or member profiles, the providers we interviewed were diverse. The majority (40%) were entrepreneurs but there were also freelancers, remote and local workers, students, retirees, digital nomads and local residents. In terms of ownership, most (57%) were joint ventures, that is, partnerships between city councils, universities, established companies and/or start-ups and philanthropists. Thirteen were owned and managed by public universities and other tertiary institutions, ten percent were funded entirely by governments such as those coworking spaces in city and state libraries and only three percent were owned by NGOs. The remaining (seventeen percent) were privately owned and operated.

As far as business and operating models were concerned, all were membership-based although fee structures varied, ranging from a nominal fee or no fee to hundreds of dollars per month, depending on the type of membership and ownership. Seventeen percent of the coworking spaces we studied offered office facilities only with no or minimal services. The overwhelmingly majority (83%) of the coworking spaces offered both coworking spaces and membership services. These typically included networking events, mentoring and business-related training, business mailing address, parking, locker and shower facilities.

We found that some coworking spaces were bundled with other services such as a coffee shop, a meditation room, and a gym. It was interesting to find that nearly 30 percent of the privately-owned coworking spaces that we studied were owned and managed by female entrepreneurs. Some of them were open to women only, offering women-centric services such as child-care and salon services. Three of the coworking spaces were hotel and hostel operators which offered their guests and the general public their coworking facilities. The hostel coworking spaces were particularly appealing to international backpackers and digital nomads. Most recently, some of the coworking spaces started to offer a virtual membership option with a much lower fee to attract those living in regional and remote areas. This option provided members with access to the online coworking community and the events and activities provided by the coworking spaces.

Motivations, objectives, and outcomes – Provider's perspective

Community building and entrepreneurship

In terms of the motivations and objectives of establishing and running coworking spaces, the most striking themes from a provider's perspective are community building and entrepreneurship (see Appendix for detail). We found that the providers we interviewed shared a common agenda – creating a coworking community for members to interact with each other, creating and sharing ideas, and facilitating innovation through collaboration. One of the founders of coworking spaces told us:

> *The objective was to build an entrepreneur eco-system and seek to bring 20,000 entrepreneurs by 2021 into a membership community with 1,000 members.*

Another female owner and operator of a coworking space had one ultimate goal, that is, helping women start and build a successful business and start-up by providing a one-stop shop.

When asked about the level of success and outcomes of coworking spaces, two of the founders/owners made the following comments:

> *At our level, it is more about playing a community role than an actual money-making business, it is more about providing these start-ups with what they need and hopefully see them outgrow the space like a few did.*

> *After nearly three years' operation, our coworking spaces have helped 11 of our members set up their own businesses and 6 of them have broken even and 1 of them is very successful. We are very pleased with the results so far.*

The proceeding comments reflected the different views and motivations of providers in running coworking spaces. However, they shared a common goal of incubating and nurturing entrepreneurs through their coworking spaces.

Interestingly, for university coworking spaces, some of the participants suggested that bringing entrepreneurs and start-up workers to campuses to co-work with students and staff helped with experiential learning and idea generation and development, thus enriching students' learning experience. In some cases, we found in our interviews that students described how their social skills had been developed through the coworking spaces. University coworking spaces were also seen as an innovation hub for university entrepreneurship and research commercialisation, providing students and researchers with access to industry and insights from entrepreneurs, investors and commercialisation experts.

Motivations, objectives, and outcomes – User's perspective

Social interaction

As far as coworking space users or members were concerned, we found that people joined coworking spaces for different purposes and with different expectations. The most common reason cited by users was the social interaction among members. However, the social interaction led to different outcomes due to the different motivations of users. For some, the social interaction helped the exploration and sharing of ideas as well as developing new business and professional networks and providing needed opportunities and mentoring advice.

> *'We've been able to leverage the other people's networks since we joined the coworking space,' said one of the users.*

Prior research suggests that informal exchange and cooperation in the form of horizontal interaction with others is likely to lead to knowledge transfer because of geographical, social or cognitive proximity (Boschma, 2005). We found that the eventful aspect of coworking spaces played a key role in members' horizontal interactions and networking. For others, the social interaction helped ease the social isolation and loneliness experienced from working alone. For the remote workers we interviewed, they felt strongly about the benefits of social contact with others. One told us 'working alone at home for a while had made me almost lose my sanity and taken a toll on my health. I feel happier and less lonely since joining a coworking space'. We also found that some users felt motivated by others and were able to get more work done, compared with working at home. An increasing number of studies suggest that one of the most valuable aspects of coworking is the social interactions and social ties in the coworking community, instilling a sense of belonging (e.g. Mitev et al., 2019; Spinuzzi et al., 2019). Two of the interviewees commented:

> *It's the community that we have that makes the difference. On many occasions we have people helping each other. We have a SEO expert who is taking care of couple of other members SEO. Collaboration can mean that, if I am having a bad day, I can go for a walk with other members.*

Sharing ideas and learning from others' experiences, and co-designing and co-creation are some of the activities you see here. This aspect is particularly appealing to innovative companies and entrepreneurs (Avdikos and Merkel, 2020). In this regard, the coworking space model addresses a general concern over the recent urban

transformation that 'public spaces and their character changed as they ceased to function as facilitators for social interaction and were reserved for merely utilitarian purposes' (Mandeli, 2019, p. 2). Our findings suggest that coworking spaces can address both social-cultural needs and economic needs of the public and demonstrate a new way to serve multiple stakeholders of smart cities.

Flexibility and proximity

We found that among the users interviewed, there were two local workers who were sent by their employers to work in coworking spaces. For them, coworking spaces were a place for fresh and innovative ideas in a non-conventional entrepreneurial' environment and provided them with the flexibility in working hours with 24/7 access and proximity to home and transportation. These participants were generally happy with this workplace arrangement and appreciated the flexibility given by their companies. This finding supports the view that flexibility helps attract and retain best talents for companies (Smith et al, 2019).

Cost

Some-cost-related reasons for coworking were cited in our interviews. For example, the lower costs compared with renting an office was one of the main reasons cited by young entrepreneurs and start-ups who had little disposable income or resources. The low-cost facilities and services provided by coworking spaces also helped start-ups to get to market quicker without the hassle of office management issues and overheads according to some our interviewees. One of the users commented that the flexible leasing terms (i.e. casual rate, weekly, monthly and yearly) of coworking spaces compared with 5-10 years' lease in rental markets helped reduce capital costs.

Key challenges for providers

We found that many of the coworking spaces we studied were facing serious issues and challenges. We identified and discussed three mostly cited issues raised by the providers interviewed (see Appendix for detail).

Cost

Six out of ten space providers whom we interviewed expressed their concerns about future funding. Some of the providers indicated that they would have to close their coworking spaces when their funding dried up and if they could not find further funding. We posit that this issue may relate to the current business models of most coworking spaces. We found that most of coworking spaces we studied were not-for-profits entities. The majority of the coworking spaces except for those owned by city councils and public educational institutions, relied primarily on membership fees and corporate sponsorship through up-selling and cross-selling other services to their users as well as organizing events, trying to reach a breakeven point. Lack of support from some city councils was cited as a key issue in particular in terms of funding.

Space

Space for in coworking can be limited due to the high demand from users. Those (5 out of ten) who wanted to expand or move their coworking spaces were struggling to find affordable stock at the locations in or close to business centres and/or innovation hubs. It was reported that in Australia, coworking spaces accounted for about 5% of current city office stock and could rise to 30% by 2030 according to the current annual growth rate of 19% (Cheung, 2018). The upward trend of demand for coworking spaces could be an opportunity for advocates of smart city planning and governance to think strategically about the location, infrastructure and design of coworking spaces.

Support

Our participants were somewhat polarized in their views about the role, attitude and actions of smart city councils and urban planners with respect to coworking spaces. We found that some founders of coworking spaces were given substantial attention by their city councils. Others complained that they were rarely engaged in their city's planning process and that urban planners generally did not identify or recognize the opportunities that coworking spaces presented as a new way people can use buildings in smart cities.

User retention

Other challenges related to coworking that we found in our interviews included those associated with attracting and retaining users since most of tended to move to larger coworking spaces once they developed. The fluidity of freelance working schedules and providing parking spaces to users and their guests also made it hard for providers to meet the needs of their users and thereby retain them.

Key challenges for users

Culture fit

From the users' perspective, a vibrant community culture (e.g. shared norms, languages, and values among members) of the coworking spaces came as one of the most important issues and challenges. One of the interviews put it this way:

> *You get a culture, serendipity, community, and even with coworking in general, it's not about the facilities, it's all about the people, you want people who are of that same philosophy of sharing and helping each other.*

Distraction

Other commonly cited issues were unwanted distraction or interruption and lack of privacy in the coworking spaces. Phone calls and side conversations were the main source of such distraction. To deal with these issues, some coworking spaces developed a code of conduct and etiquette. Some members resorted to noise cancelling headphones. Superior office facilities including size of rooms and numbers of desks as well as speed of Wifi and Internet were some of the reasons that prompted people to move from one coworking space to another. A few of the users we interviewed cited the cost of membership as a main deterrent to their use of coworking spaces.

5. Discussion and Implications

This study has examined the motivations and challenges of coworking space from both providers and user perspectives. The discrepancies and similarities identified from this study have implications for researchers and practitioners in in a range of relevant fields. First, the coworking space concept and model resonates well with the concept of smart city 2.0 which emphasizes people-centric innovations and collaborative participation (Trencher, 2019). Many researchers and practitioners favour a human-centred discourse in smart city strategy and advocate for citizen and community engagement (e.g. Carrasco-Sáez et al. 2017). Our findings show that coworking spaces contribute to collaboration, openness, and community engagement, which incidentally are the key elements of smart cities 2.0 (Trencher, 2019). From urban space and environmental perspectives, coworking spaces are likely to contribute to urban mobility and sustainability. This is another crucial component of smart cities (Annunziato and Maestosi, 2018). This is because coworking spaces located in urban community areas allow people to work closer to home and reduce average commuting time and rates of carbon emission.

Second, this study addresses an important emerging scenario in today's workforce as it becomes more fluid and mobile and takes advantage of the rapid development of digital technologies. Many jobs created in the sharing economy allow workers to decide on when, where and with whom they work with. It is estimated that the majority of U.S. workers will be freelancing by 2027 (Pofeldt, 2017). In Australia, less than half of Australians are working in a permanent full-time role in 2018 and the upward trend is growing (Jericho, 2018). Casualization in the workforce has become a notable trend, which leads to a nomadic and precarious worklife (Gandini, 2015). On the other hand, the increasing demands by workers for flexibility in terms of hours with less commuting time and more work-life balance (Erden Bayazit and Bayazit, 2019) are echoed in our findings. Research suggests that coworking spaces have become a critical urban practice because these spaces provide the support to the rising number of freelancers to cope with the informality, uncertainty and risks associated with independent work (Merkel, 2019). The implication for urban planning would be the creation of more coworking spaces and reconfiguration of some of the exiting urban spaces to meet this demand. The study suggests that these trends are likely to increase the demand for coworking spaces.

Third, the findings of this study highlight the importance of social capital generated through social interaction in coworking spaces as a platform for open innovation and collaboration. From a social capital perspective, social relations, norms and identities enable actors, whether individuals, groups or even organisations, to coordinate actions in order to achieve desired outcomes (Nahapiet and Ghoshal, 1998; Tsai and Ghoshal, 1998). Relationships form an important source of social capital providing benefits of access to information, knowledge and resources (Suseno et al. 2018). Some of the outcomes of the coworking spaces studied are a clear indication of the social capital derived from relationships and exchanges in the form of capacity building, social competency and networks (see Appendix for more detail). The study of coworking spaces from a social capital perspective would be a valuable addition to smart city ecosystem research.

Fourth, from an urban economic perspective, this study shows that coworking spaces provide a collaborative environment and often a breeding ground for entrepreneurship, where entrepreneurs and microbusinesses explore and share new production opportunities often in non-hierarchical situations (Gandini, 2015). The findings indicate that coworking spaces become start-up communities driving innovation and entrepreneurship in smart cities. Entrepreneurship was one of the most salient themes in the coworking spaces as shown in our findings. With the rapid diffusion and advances of digital technologies, digital entrepreneurship becomes increasingly a driving force for the urban economy and an imperative part of smart city ecosystems. These findings will inform

urban policy makers and help them better understand and tap into this source of civic entrepreneurship derived from coworking spaces.

Fifth, from a public space perspective, the findings of this study provide insight into how public spaces can be optimally used for coworking practice. Studies suggest that high quality public spaces are likely to offer economic, social and environmental benefits to their localities and communities (e.g. Carmona, 2019). The centrality of public spaces can also bring psycho-social benefits. Given the multiplicity of public spaces whether formal or informal, coworking spaces have demonstrated their value as social public spaces that encourage social engagement and diversity and contribute to the urban social fabric. This is consistent with previous studies indicating accessibility, activity, comfort, liveliness and sociability are the common benefits of public spaces (Heffernan et al., 2014; Mehaffy et al., 2019). The coworking spaces can be used as a new form of public space and a workplace to achieve these benefits. This implies that smart city planning needs to consider innovative use of high street spaces and the role of formal or informal spaces as part of a portfolio of locations where people can work and interact.

6. Contributions, limitations and future study

This study contributes to the extant literature and practices mainly in three ways. First, it contributes to the current understanding and research of coworking spaces and their role in developing social and cultural fabrics as well as growing entrepreneurship in smart cities. The insightful findings of this study highlight the benefits generated from the coworking spaces studied and the issues and challenges they were facing. In this regard, the study will help both providers and users of coworking spaces in running and using coworking spaces in the future. Second, the study enriches smart city literature by investigating what and how coworking spaces can do in the smart city ecosystems. This novel lens sheds light on how to conceptualize smart cities, which are more about community and citizen centric than smart technologies. Third, the study and the findings inform urban policy makers and help better understand and tap into the source of civic entrepreneurship derived from coworking spaces which could become a solid base to build digital entrepreneurship for sustainable, liveable and competitive cities (Cetindamar et al., 2020).

However, like all the studies, our research has its limitations. First, from a methodological perspective, our qualitative approach does not allow the quantitative measurement of the specific impacts or effects of coworking spaces on smart city ecosystems and urban economy and city life. However, our findings provide an in-depth insight into how coworking spaces are likely to generate, both directly and indirectly, economic and socio-cultural impacts on smart cities and urban planning as well as contribute to smart city ecosystems. Future research in the form of quantitative studies could investigate the relationships between the density of coworking spaces and smart city maturity in terms of innovation, citizens' participation as well as the moderating effect of the socioeconomic characteristics of the cities in which coworking spaces operate.

Second, our study only provided a broad picture of motivations and challenges of coworking space, social relations and cultural aspect of coworking spaces should be explored at a much deeper level, which goes far beyond informal social learning (Bilandzic and Foth, 2013). For example, our findings suggest that coworking spaces help mitigate the mental and health issues of remote workers. Questions remain about the processes through which the social relations develop in coworking spaces and the role they play in not only enhancing economic performance but also fostering entrepreneurial capability building and enhancing members' mental well-being. Recent empirical research (e.g. King. 2017; Robelski et al. 2019) found that working in a coworking

space had a positive effect on mental health and reduced the loneliness and depression caused by the isolation of working from home. More research is needed in this regard.

Third, the relationship between smart cities and (digital) entrepreneurship have attracted some research interest recently (e.g. Sarma and Sunny, 2017; Kraus et al. 2019). The majority of the founders and users of the coworking spaces in the current study were entrepreneurs. Our interviews suggested that coworking spaces were a fertile ground for growing entrepreneurship. But given the limited space of our paper, we were not able to delve into the relationship further. Future research could investigate how the socio-technical network among entrepreneurs in the coworking spaces is likely to play a key role in smart cities.

Finally, at the time of submitting this paper, the global coronavirus pandemic has reached the stage where many of the providers and users interviewed in this study have had to temporarily shut down coworking spaces and resume working at home. What this study suggests is that this shock should not be allowed to result in more than a temporary pause to an important and dynamic aspect of the socio-economic systems surrounding smart cities. We posit that post-pandemic studies need to be conducted about the factors influencing the speed and scope of reconstruction of coworking spaces and the lessons learned about protecting and nurturing this vital aspect of the economic and socio-cultural fabric.

7. Concluding remarks

This paper studies the trend of coworking spaces in the context of smart cities and examines its implications in an integrative way, namely, from economic, social and cultural perspectives. By doing so, the study provides a better understanding, at a strategic level, about what role coworking spaces are likely to play in smart cities and smart city ecosystem. The findings of the study inform urban policymakers and urban planners with empirical insights into the trend of coworking spaces and the key issues and challenges they are facing, which may lead to better engagement with the trend.

Appendix – A snapshot of data display from interviews (N=34)

Main questions	Provider/ User*	Key themes & No. (%) responses	Examples (Quotes)
What are your main purposes and motivations as a provider or a user of coworking space?	**Provider** (10)	• Entrepreneurship - 10(100) • Community building - 10(100) • Collaboration – 10(100)	• *The objective was to build an entrepreneur eco-system and seek to bring 20,000 entrepreneurs by 2021 into a membership community with 1,000 members.* • *To promote and advocate for entrepreneurship, and change the culture to encourage entrepreneurship* • *To provide incubators and physical infrastructure for young entrepreneurs seeking a fashion for entrepreneurship and entrepreneurial competence* • *To facilitate collaboration, bolster motivation and provide concentrated support services*
	User (24)	• Social interaction – 22(92) • Entrepreneurship – 13(62) • Flexibility – 11(46) • Proximity – 11(46) • Services provided – 10(42)	• *Working alone at home for a while had made me almost lose my sanity and taken a toll on my health. I feel happier and less lonely since joining a coworking space.* • *Most of my coworking space members are entrepreneurs like me, from diverse background, expertise, experience and different age groups. We discuss ideas and how to make them work.* • *Flexibility in working hours means a lot to me due to family*

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

		• Costs – 8(33) • Lifestyle/career change – 9(38)	*commitment. The 24/7 access to this office is what I'm after.* • *This place is half-way between home and work, not merely the physical proximity but I just feel some sense of connection with the place.* • *I don't need to worry about lease, electricity bills, catering, kitchens etc. and the cost is much lower than hiring an office. I can focus on doing business and rest all taken care of by the coworking space.* • *Seeking for lifestyle change, having been in the corporate world for years, wanted to be a freelancer, having my own business.*
How do you feel about the outcomes?	**Provider** (10)	• Collaboration/community – 10(100) • New start-ups – 10(100) • business skills – 7(70) • Social competency – 3(30)	• *At our level, it is more about playing a community role than an actual money-making business, it is more about providing these start-ups with what they need and hopefully see them outgrow the space like a few did.* • *After nearly three years' operation, our coworking spaces have helped 11 of our members set up their own businesses and 6 of them have broken even and 1 of them is very successful. We are very pleased with the results so far.* • *There have been 4 VR (virtual reality) start-ups that were originated from this coworking space.* • *Intelligent students are often socially and commercially naïve. After 12 months working in the coworking space, they have improved social skills and are better leaders and managers.*
	User (24)	• Sense of community – 18(75) • Networking building – 16(67) • Capacity building – 8(33)	• *It's the community that we have makes the difference. On many occasions we have people helping each other. We have a SEO expert who is taking care of couple of other members SEO. Collaboration, if I am having a bad day I can go for a walk with other members.* • *Coworking spaces break the isolation and link you with stimulating interesting bright people with face-to-face contacts.* • *Coworking and mentors here help shape and refine my business model; this sustains me in the cash burn and long lead times and my capability development.*
What are the major issues and challenges you have?	**Provider** (10)	• Lack of funding – 6(60) • Shortage of right stock – 5(50) • Lack of support – 5(50)	• *We had council's start-up fund to open the coworking space 3 years ago, but they are not going to fund us again. We may have to close the door soon if we can't get the support.* • *I've been planning to expand given the demand but struggling to find the right stock because of location, rental price and space and time flexibility.* • *I would like to see more support for coworking spaces as it is a significant investment for local community and small businesses.*
	User (24)	• Cultural fit – 13(54) • Distraction – 9(38)	• *You get a culture, serendipity, community, and even with coworking in general, it's not about the facilities, it's all about the people, you want people who are of that same philosophy of sharing and helping each other.* • *Some people ignore the presence of others when receiving calls, talked quite loudly, sometimes I was forced to wear noise-cancelling headphone just to be able to get work done. .*

Note: We interviewed a total of 10 providers and 24 users of coworking spaces.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

References

Albino, V., Berardi, U., & Dangelico, R. M. (2015). Smart cities: Definitions, dimensions, performance, and initiatives. *Journal of urban technology*, 22(1), 3-21. http://dx.doi.org/10.1080/10630732.2014.942092

Amador, C. (2018). Coworking is the new normal, and these stats prove it. Accessed online at https://allwork.space/2018/03/coworking-is-the-new-normal-and-these-stats-prove-itt/ .

Angelidou, M. (2015). Smart cities: A conjuncture of four forces. *Cities*, 47, 95-106. http://dx.doi.org/10.1016/j.cities.2015.05.004

Appio, F. P., Lima, M., & Paroutis, S. (2019). Understanding Smart Cities: Innovation ecosystems, technological advancements, and societal challenges. *Technological Forecasting and Social Change*, 142, 1-14. http://dx.doi.org/10.1016/j.techfore.2018.12.018

Avdikos, V., & Merkel, J. (2020). Supporting open, shared and collaborative workspaces and hubs: recent transformations and policy implications. *Urban Research & Practice*, 1-10. http://dx.doi.org/10.1080/17535069.2019.1674501

Bilandzic, M., & Foth, M. (2013). Libraries as coworking spaces: Understanding user motivations and perceived barriers to social learning. *Library High Technology*, 31(2), 254-273. http://dx.doi.org/10.1108/07378831311329040

Boschma, R. (2005). Proximity and innovation: a critical assessment. *Regional studies*, 39(1), 61-74. http://dx.doi.org/10.1080/0034340052000320887

Botsman, R., & Rogers, R. (2011). What's mine is yours. NY: Collins, New York.

Bounchen, R. B., Laudien, S. M., Fredrich, V., & Görmar, L. (2018). Coopetition in coworking-spaces: value creation and appropriation tensions in an entrepreneurial space. *Review of Managerial Science*, 12(2), 385-410. http://dx.doi.org/10.1007/s11846-017-0267-7

Bueno, S., Rodríguez-Baltanás, G., & Gallego, M. D. (2018). Coworking spaces: a new way of achieving productivity. Journal of Facilities Management. https://doi.org/10.1108/JFM-01-2018-0006

Carmona, M. (2019). Principles for public space design, planning to do better. *Urban Design International,* 24, 47–59. http://dx.doi.org/10.1057/s41289-018-0070-3

Carr, S., Francis, M., Rivlin, L. G. and Stone, A. M. (1992). Public Space. Cambridge: Cambridge University Press.

Carrasco-Sáez, J. L., Careaga Butter, M., & Badilla-Quintana, M. G. (2017). The new pyramid of needs for the digital citizen: a transition towards smart human cities. *Sustainability*, 9(12), 2258. http://dx.doi.org/10.3390/su9122258

Cetindamar D., Lammers T., Sick N. (2020) Understanding the Relationship Between Smart Cities and Entrepreneurial Ecosystems: The Case of Sydney. In: Biloria N. (eds) *Data-driven Multivalence in the Built Environment*. S.M.A.R.T. Environments. Springer, Cham. https://doi.org/10.1007/978-3-030-12180-8_15

Cheung, A. (2018). Coworking office space in Australia to triple by 2030, report finds. Accessed on 11 September 2018 online at: https://www.commercialrealestate.com.au/news/coworking-office-space-in-australia-to-triple-by-2030-report-finds/

Costamagna, F., Lind, R., & Stjernström, O. (2019). Livability of Urban Public Spaces in Northern Swedish Cities: The Case of Umeå. *Planning Practice & Research*, 34(2), 131-148. http://dx.doi.org/10.1080/02697459.2018.1548215

Erden Bayazit, Z., and Bayazit, M. (2019). How do flexible work arrangements alleviate work-family-conflict? The roles of flexibility i-deals and family-supportive cultures. *The International Journal of Human Resource Management*, 30(3), 405-435. http://dx.doi.org/10.1080/09585192.2017.1278615

European Commission, 2019. Digital single market and smart cities. Accessed on 10 February 2020 at https://ec.europa.eu/digital-single-market/en/smart-cities

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Gandini, A. (2015). The rise of coworking spaces: A literature review. *Ephemera,* 15(1), 1-13. Accessed on 4 October 2017 at http://www.ephemerajournal.org/contribution/rise-coworking-spaces-literature-review

Gandini, A., & Cossu, A. (2019). The third wave of coworking: 'Neo-corporate 'model versus 'resilient' practice. *European Journal of Cultural Studies*, http://dx.doi.org/10.1177/1367549419886060

Garrett, L. E., Spreitzer, G. M., & Bacevice, P. A. (2017). Co-constructing a sense of community at work: The emergence of community in coworking spaces. Organization Studies, 38(6), 821-842. https://doi.org/10.1177/0170840616685354

Heffernan, E., Heffernan, T., & Pan, W. (2014). The relationship between the quality of active frontages and public perceptions of public spaces. *Urban Design International*, 19(1), 92-102. http://dx.doi.org/10.1057/udi.2013.16

Jericho, G. 2018. We should be concerned about the casualisation of full-time work. The Guardian. Accessed on 13th June 2018 at https://www.theguardian.com/business/grogonomics/2018/jan/16/we-should-be-concerned-about-the-casualisation-of-full-time-work

Kraus, S., Palmer, C., Kailer, N., Kallinger, F. L., & Spitzer, J. (2019). Digital entrepreneurship. *International Journal of Entrepreneurial Behavior & Research.* http://dx.doi.org/10.1108/IJEBR-06-2018-0425

King S. 2017. Coworking is not about workspace — It's about feeling less lonely. Harvard Business Review. Accessed on 20 June 2018 at https://hbr.org/2017/12/coworking-is-not-about-workspace-its-about-feeling-less-lonely.

Krueger, A. (2019) When libraries are also tourist draws. The Business Times (August 15th 2019). Accessed at https://www.businesstimes.com.sg/life-culture/when-libraries-are-also-tourist-draws

Kummitha, R. K. R., & Crutzen, N. (2017). How do we understand smart cities? An evolutionary perspective. *Cities*, 67, 43-52. http://dx.doi.org/10.1016/j.cities.2017.04.010

Letaifa, S. B. (2015). How to strategize smart cities: Revealing the SMART model. *Journal of Business Research*, 68(7), 1414-1419. http://dx.doi.org/10.1016/j.jbusres.2015.01.024

Mandeli, K. (2019). Public space and the challenge of urban transformation in cities of emerging economies: Jeddah case study. *Cities,* 95, 102409. http://dx.doi.org/10.1016/j.cities.2019.102409

Marek, L., Campbell, M., & Bui, L. (2017). Shaking for innovation: The (re) building of a (smart) city in a post disaster environment. Cities, 63, 41-50. http://dx.doi.org/10.1016/j.cities.2016.12.013

Mariotti, I., Pacchi, C., & Di Vita, S. (2017). Co-working spaces in Milan: Location patterns and urban effects. *Journal of Urban Technology*, 24(3), 47-66. http://dx.doi.org/10.1080/10630732.2017.1311556

Marvin, S., Luque-Ayala, A., & McFarlane, C. (Eds.). (2015). Smart urbanism: Utopian vision or false dawn? Routledge.

Meijer, A., & Bolívar, M. P. R. (2016). Governing the smart city: a review of the literature on smart urban governance. *International Review of Administrative Sciences*, 82(2), 392-408. http://dx.doi.org/10.1177/0020852314564308

Mehaffy, M. W., Elmlund, P., & Farrell, K. (2019). Implementing the new urban agenda: The central role of public space. *Urban Design International*, 24(1), 4–6. http://dx.doi.org/10.1057/s41289-019-00091-9

Merkel, J. (2019). 'Freelance isn't free.' Co-working as a critical urban practice to cope with informality in creative labour markets. *Urban Studies*, 56(3), 526-547. http://dx.doi.org/10.1177/0042098018782374

Minichiello, V., Aroni, R., & Minichiello, V. (1990). *In-depth interviewing: Researching people*. Longman Cheshire.

Miles, M. B., Huberman, A. M., Huberman, M. A., & Huberman, M. (1994). Qualitative data analysis: An expanded sourcebook. Sage. https://books.google.co.uk/books?id=U4lU_-wJ5QEC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Mitev, N., De Vaujany, F. X., Laniray, P., Bohas, A., & Fabbri, J. (2019). Coworking spaces, collaborative practices and entrepreneurship. In Collaboration in the digital age (pp. 15-43). Springer, Cham. https://www.researchgate.net/publication/326155870_Co-working_spaces_collaborative_practices_and_entrepreneurship

Mora, L., Deakin, M., & Reid, A. (2019). Strategic principles for smart city development: A multiple case study analysis of European best practices. *Technological Forecasting and Social Change*, 142, 70-97. http://dx.doi.org/10.1016/j.techfore.2018.07.035

Moriset B (2014) Building new places of the creative economy: the rise of coworking spaces. In: Paper presented at the 2nd Geography of Innovation Conference, Utrecht University, Utrecht https://halshs.archives-ouvertes.fr/halshs-00914075/document

Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review*, 23(2), 242-266. http://dx.doi.org/10.5465/amr.1998.533225

Nathan, M. (2017). The fast growth of coworking spaces in London. *LSE Business Review*. https://blogs.lse.ac.uk/businessreview/2017/10/11/the-fast-growth-of-co-working-spaces-in-london/

Ojo, A., Dzhusupova, Z., & Curry, E. (2015). Exploring the Nature of the Smart Cities Research Landscape. In R. Gil-Garcia, T. A. Pardo, & T. Nam (Eds.), Smarter as the New Urban Agenda: A Comprehensive View of the 21st Century City. Springer. https://www.researchgate.net/publication/280625329_Exploring_the_Nature_of_the_Smart_Cities_Research_Landscape

Office Hub (2018). The Australian coworking market report – 2017/2018. Accessed online at https://www.office-hub.com.au/wp-content/uploads/2018/09/Office-Hub-The-Australian-Coworking-Market-Report-2017-18-LR.pdf

Pofeldt, E. 2017. Are We Ready For A Workforce That is 50% Freelance? Accessed on 3rd May at 2018 https://www.forbes.com/sites/elainepofeldt/2017/10/17/are-we-ready-for-a-workforce-that-is-50-freelance/#532a9b893f82

Ravazzoli, E., & Torricelli, G. P. (2017). Urban mobility and public space. A challenge for the sustainable liveable city of the future. *The Journal of Public Space,* 2(2), 37-50. http://dx.doi.org/10.5204/jps.v2i2.91

Robelski, S., Keller, H., Harth, V., & Mache, S. (2019). Coworking Spaces: The Better Home Office? A Psychosocial and Health-Related Perspective on an Emerging Work Environment. *International Journal of Environmental Research and Public Health*, 16(13), 2379. http://dx.doi.org/10.5204/jps.v2i2.91

Sarma, S., & Sunny, S. A. (2017). Civic entrepreneurial ecosystems: Smart city emergence in Kansas City. *Business Horizons*, 60(6), 843-853. http://dx.doi.org/10.1016/j.bushor.2017.07.010

Sancino, A., & Hudson, L. (2020). Leadership in, of, and for smart cities–case studies from Europe, America, and Australia. *Public Management Review,* 1-25. http://dx.doi.org/10.1080/14719037.2020.1718189

Smith, E. F., Gilmer, D. O., & Stockdale, M. S. (2019). The importance of culture and support for workplace flexibility: An ecological framework for understanding flexibility support structures. *Business Horizons*, 62(5), 557-566. http://dx.doi.org/10.1016/j.bushor.2019.04.002

Spinuzzi, C., Bodrožić, Z., Scaratti, G., & Ivaldi, S. (2019). "Coworking Is About Community": But What Is "Community" in Coworking? *Journal of Business and Technical Communication*, 33(2), 112-140. http://dx.doi.org/10.1177/1050651918816357

Suseno, Y., & Pinnington, A. H. (2018). The significance of human capital and social capital: professional–client relationships in the Asia Pacific. *Asia Pacific Business Review*, 24(1), 72-89. http://dx.doi.org/10.1080/13602381.2017.1281641

Tsai, W., & Ghoshal, S. (1998). Social capital and value creation: The role of intrafirm networks. *Academy of management Journal*, 41(4), 464-476. http://dx.doi.org/10.5465/257085

Tompson, T. (2017). Understanding the Contextual Development of Smart City Initiatives: A Pragmatist Methodology. *She Ji: The Journal of Design, Economics, and Innovation,* 3(3), 210-228. http://dx.doi.org/10.1016/j.sheji.2017.11.004

Trencher, G. (2019). Towards the smart city 2.0: Empirical evidence of using smartness as a tool for tackling social challenges. *Technological Forecasting and Social Change*, 142, 117-128. http://dx.doi.org/10.1016/j.techfore.2018.07.033

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

UNESCO 2019. Smart cities: shaping the society of 2030. UNESCO Publishing
https://books.google.co.uk/books?id=chqXDwAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Yin, R. K. 2011. *Qualitative Research From Start to Finish*. New York: The Guilford Press.

Zhou, Y. (2019). A taxonomy of coworking space: Manhattan, NYC. *Cornell Real Estate Review*, 17(1), 58-65.
https://scholarship.sha.cornell.edu/cgi/viewcontent.cgi?article=1270&context=crer

Fang ZHAO (PhD) is the Professor of Innovation and Strategy and Associate Dean – Research and Enterprise at Staffordshire Business School, Staffordshire University, UK. She has published over 110 research works internationally and in some of the top-tier leading journals in the study fields. Zhao's current research focuses on innovation strategy, smart cities, impact of Covid-19 on SMEs and digital transformation.
ORCID ID: 0000-0003-3718-6999

Catherine PRENTICE (PhD) is an Associate Professor of Marketing at Griffith University, Australia, and the Director of Asia Pacific Association for Gambling Studies. She has published more than 60 in Q1 or top-tier marketing and management journals within last few years. Her main research interests include service research, consumer psychology, consumer behavior, artificial intelligence, emotional intelligence, services and relationship marketing, and gambling studies.
ORCID ID: 0000-0002-7700-3889

Joseph WALLIS (PhD) is the Professor and Dean of the School of Business at the American University of Ras Al Khaimah in the United Arab Emirates. Joe's research focus is in the areas of public economics, public administration, leadership and policy reform. He has co-authored 5 books including most recently The International Handbook of Public Management Reform (Edward Elgar 2009) and Reform and Leadership in the Public Sector (Edward Elgar 2009) and has written over 90 articles in journals including Governance, World Development, Public Administration, Local Government Studies, Internet Research and Public Money and Management.
ORCID ID: 0000-0002-6584-3426

Arvind PATEL (PhD) is the Professor and Head, School of Accounting and Finance at the University of the South Pacific. A graduate of the University of South Pacific, University of New South Wales and University of Queensland in Australia, has research interest in corporate governance, auditing, financial accounting, business finance and information systems. Publications included in top tier journals in information systems, accounting and economics. Current research interest in CEO succession and stock crash risk.
ORCID ID: 0000-0002-3223-7585

Marie-France WAXIN (PhD) is the Professor of Human Resource Management at the American University of Sharjah, in the United Arab Emirates. Her research interests and publications focus on strategic and sustainable HRM in private and public organisations. She is especially interested in talent management, global HRM, diversity management, and environmental management.
ORCID ID: 0000-0002-0660-5452

ARTIFICIAL INTELLIGENCE COMPONENTS AND FUZZY REGULATORS IN ENTREPRENEURSHIP DEVELOPMENT[*]

Sergii Bogachov [1], Aleksy Kwilinski [2], Boris Miethlich [3], Viera Bartosova [4], Aleksandr Gurnak [5]

[1*]*PO "Institute for Local and Regional Development", Osipovsky st., 9, apart. 120, Kiev, 04123, Ukraine*
[2]*The London Academy of Science and Business, 3rd Floor, 120, Baker Street, London, W1U 6TU, England*
[3]*Comenius University in Bratislava, Odbojárov 10, 82005, Bratislava, Slovak Republic*
[4]*University of Zilina, Univerzitna 1, 01026, Zilina, Slovak Republic*
[5] *Financial University under the Government of the Russian Federation, Leningradsky Prospekt 49, Moscow, 125167, Russia*

E-mail: [1] koaduep@gmail.com (Corresponding author)*

Abstract. The article provides a comparative study of the possibility of entrepreneurship development based on fuzzy signals of business activity and applied elements of artificial intelligence. The principal research methods that determine the logic and practical basis of the application of fuzzy logic in entrepreneurship are highlighted. It has been determined that fuzzy modeling is effective when technological processes are too complex for analysis using generally accepted quantitative methods, or when available sources of information in the business environment are interpreted poorly, inaccurately, and indefinitely. It has been shown experimentally that fuzzy logic gives better results compared to those obtained with generally accepted algorithms for analyzing the quality of doing business. A model of a neuro-fuzzy regulator has been developed and measures for its implementation in the business environment have been proposed. A neural network model in entrepreneurial development has been formed. Studies have shown the possibility of effective use of the principles of artificial intelligence and modeling in solving problems of developing entrepreneurial potential and making business decisions under conditions of uncertainty. This ensures objective and well-grounded decision-making in solving various applied problems of business development and taking into account environmental factors. The applied tasks of supporting the adoption of entrepreneurial decisions in the conditions are formulated; uncertainty; indicating that approaches to decision-making under conditions of uncertainty based on artificial intelligence and fuzzy logic tools are universal and require appropriate careful study and adaptation to a specific applied problem in the business environment.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

1. Introduction

The problem of considering intellectual activity in entrepreneurship becomes a primary one, unlike the approach of designing traditional artificial intelligence systems from the 'bottom-up' principle based on "rigid models" of information management systems. This approach requires deviation from the concept of "regulatory management models". The basis of a new subject-oriented approach to the entrepreneurship development is research aimed at developing methods based on the selection of psychological features of managerial activity that can be introduced into the model of artificial intelligence (Axelrod, (1997). This position is based on the position of cognitive psychology and attempt to formalize actions typical for the entrepreneur in making commercial decisions and system development. These provisions form the relevance of this study.

2. Literature Survey

In modern scientific literature, it is advisable to single out groups of researchers on the development of entrepreneurship based on methods of fuzzy logic and applied elements of artificial intelligence.

1) *Constructive and instructive presentation of the development process in entrepreneurship*. The traditional developmental command system used is changed to the presentation of educational material in the form of constructor for knowledge building by the "pupil" (Petruzzi, Dada (2002); Snow et. al. (2017). The author's intention is to provide instructions for using the "knowledge constructor" within a particular subject area. As (Walker, (2010); Whitehead and Choate (1994) points out in the model of artificial intelligence development - it is "electronic" technology, wherein the new education system based on artificial intelligence has decision-making power while working with the "designer knowledge".

2) *Intellectual "building pedagogy"*. Computer information development in entrepreneurship must have powerful intellectual tools for organizing the process of integrated education (see Bostrom & Yudkowsky (2011); Dejoux, Léon (2018); Kornienko et al. (2015). The distinctive characteristics of such tools are the requirement of a non-linear process of ensuring the development of business activity.

3) The applied issues of artificial intelligence in business are considered in the works (Bostrom & Yudkowsky (2011), Weiß and Sen (1996); Kwilinski & Kuzior (2020)). The authors highlight the problem that entrepreneurship today cannot be based on discrete data. It is necessary not only to systematize information using the latest software advances but also to provide dynamic observation in the business environment, as well as to set up an algorithm for automating decisions to reduce costs in an environment of strong competition and incomplete information.

4) In the works (Drobyazko S., et al. (2019); Drobyazko S., Barwińska-Małajowicz A., et al. (2019); Olsher (2015)) it is indicated that, unlike a fuzzy set, which expresses the inaccuracy in the assessment of a certain attribute, the measure of opportunity describes uncertainty, the incompleteness of information related to the appearance of a particular event. In fact, this is a way of quantitative description (representing the meaning) of expert judgments, which is a generalization of interval analysis and the theory of errors. Currently, the measure of opportunity and its dual measure of necessity act as the main means of modeling uncertainty in entrepreneurial activity.

5) In scientific works (Ceruttia et al. (2019); Mirjalili (2019)), the artificial intelligence elements design methodology based on systematic research and empirical assessment of processes in different socio-economic systems, algorithmic variations, and choice of solutions in individual activities are presented in detail.

3. Methods

In the current study, the methodology will be considered as a set of successive actions of practical implementation of certain research processes, their procedures and operations, which achieve the solution of the research goal. In the article, the methodology forms the structure of the study, it determines the set of relevant patterns, principles, and techniques used in the disclosure of topics and the formation of scientific novelty and conclusions. The methodological basis of the research was formed by:

1) a method of formalizing processes and logical presentation of results. In a formalized scheme, all characteristics of the complex process of functioning of the system as a whole and of its individual elements are formally determined. According to the methodology, it is necessary to formally determine the parameters of processes and states, all dependencies between the characteristics and parameters of the system as a whole and its individual elements, taking into account those factors that are taken into account during formalization. The formalized scheme contains an exact analytical formulation of the task of studying the processes of business development, the set of all initial data, known parameters of the process and initial conditions.

2) The method of variants of the structure of goals. Within the framework of this methodology, the concept of correspondence between two scales of development of complex systems - a spatial scale and a temporal one relative to entrepreneurial activity is distinguished. The principle of allocation of components at the top level of the structure of goals for solving new, unexplored problems is highlighted. The "pyramid" principle, which helps to understand the branches of the goal tree, characterizes the volume of the goal area, and experience has shown that consistent movement along the edges of the "pyramid" with a return to the highest level in the already structured branches, taking into account the new vision of the development of entrepreneurial potential helps to reveal the goal area.

3) The method of structuring goals in a fuzzy representation of business processes. For the effective organization of entrepreneurial activity, an information system is needed that allows, using computer technology and new information technologies, effectively organizing the work. In the factorial representation of the decision-making information system, these components as labor resources, material and technical support, and other objects of entrepreneurial activity are distinguished

4. Results

The purpose of the current study is to form organizational principles and methodological approaches to business development based on the components of artificial intelligence and fuzzy regulators in business. The purpose of the study is determined by the need to introduce new approaches to entrepreneurship, which can accelerate development and provide quality modeling of areas of activation.

The basic principle of building a fuzzy regulator in the entrepreneurship education is based on the experience formalization of the intelligent operator which manages a dynamic object by means of the linguistic rules "if ... then" (Galbraith (2014).

The decision-making module processes fuzzy information based on a set of linguistic rules contained in it - heuristics, which are defined by the entrepreneur in the form of a language similar to the natural language of the type "If *P*, then *C*" (González et. al. (2015). Each linguistic rule contains one or more conditions for its application and appropriate action to this condition (Fig. 1).
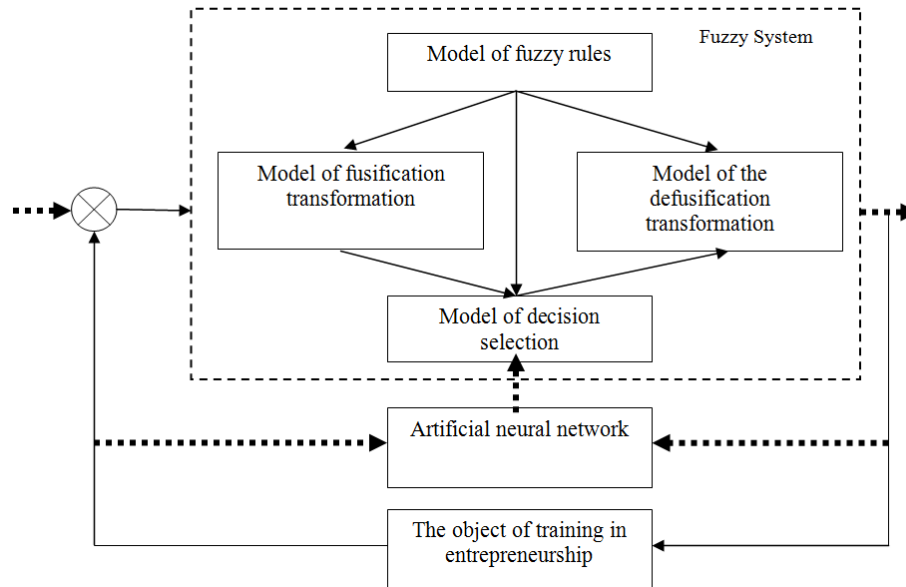
Figure 1. Architecture of fuzzy regulator in entrepreneurship development
Source: the authors

Note that an additional parameter *I* may be introduced by the expert for each fuzzy rule W_i characterizes the significance of the rule (Choe, H. & Jordan, J.B. (1992)). Then each rule is formalized in fuzzy logic by the expert's opinion which contribution to the overall score makes a fuzzy value, and the decision selection module calculates the indicated weights (Fig. 1). Note that each rule of the system analyzes only one metric. In case when there is more than one indicator, the set of input fuzzy concepts in the rule parcel is combined by the fuzzy "*I*" operation (Luckin (2017); Seifollahi et al. (2012):

$$\text{«if } P_i \text{ and } P_j \text{ and ... then } C_t \qquad (1)$$

where:
P – parameter of the fuzzy input concept;
C – parameter of the fuzzy output concept;
i – input number defining the index X_i which is defined the fuzzy concepts and linguistic rule;
j - number of fuzzy concept defined for input X_j.

When a logical condition consists of a set of fuzzy input parameters *P* combined by a fuzzy conjunction operation "*and*". Each input fuzzy concept is implemented by a fusificator of the fuzzy controller and defined at one of the fuzzy controller inputs (the input number is identified by the label index). Generalizing the result of performing fuzzy logical transformation into a single clear value at the output of the controller is performed by the defusificator (Skute (2019). Given above about the additional parameters *W*, defusificator integrates various parameters "twos" - "C_i and W_i.

Combination of the benefits of entrepreneurial development and artificial intelligence is possible through the synthesis of neuro-fuzzy systems, based on the principle of functional equivalence of architecture (Maderer (2016); Powell (1992)). The essence of the principle is interchangeable use of benefits of different classes of the architecture.

Below, we propose an algorithm for entrepreneurship development based on artificial intelligence. Activity of F_j of each i-th output element of the business development system depends on the input vector x as follows:

$$F_j(\bar{x}) = \omega_{i0} + \sum_{i=1}^{L} v_{ij} \phi_i(\bar{x})$$

(2)

where:
ω_{j0} - threshold value of the j-th output;
v_{ij} - weight connecting i-th hidden element with j-th output;
ϕ_i - nonlinear transformation performed by a hidden element.

The nonlinear transformation is performed by the number L of the radially symmetric basis functions, pre-correlating inputs with the eigenvalues of the center and deviation, i.e. $\phi_i(\bar{x}) = \phi_i(\|x - c_i\| / d_i)$, where $c_i \in \Re^n$ is the center of the basis function ϕ_i a d_j is deviation or scaling factor for radius $\|x - c_i\|$, a $\| \ \|$ - usually Euclid's norm in $\Re^n$. The Gaussian form $\phi_i(r) = exp(-r^2/2)$ is most often used as a function ϕ, which gives the finality of nonlinear transformation. In general, the task of development is to minimize the function of the network error E, which expresses the standard deviation of the network outputs from the required on a given (usually fixed) set of training pairs "input-output" during training:

$$E = \frac{1}{2KM} \sum_{i=1}^{K} \sum_{j=1}^{M} (t_j^i - o_j^i)$$

(3)

where:
K – number of training pairs;
$t^i_{\ j}$ – the target value of the output neuron when i-th input image is presented to the input;
o^i_j - real output of the output neuron when i-th input image is presented to the input; The network outputs are limited by the interval (-1,1), and the target values acquire only two possible values $t^i_j \in \{-1;1\}$.

As it is known, the radial elements with Gaussians have one very important property - action locality – the function influence can be neglected ϕ_i at a distance of more than $2d_i$ from the center c_i. This property makes it possible to evaluate the efficiency of each element independently of the others, thus to independently select the elements in the next generation. It significantly accelerates convergence of the algorithm. The following function is used to evaluate efficiency of the individual element ϕ_j, which coincides with the defusification function by virtue of the principle of functional equivalence:

$$e_j = \frac{\sum\limits_{x_k \in r} \phi_j(\overline{x_k})}{\sum\limits_{k=1}^{L} \phi_j(\overline{x_j})}$$

(4)

where:

e_j - efficiency value of *j-th* element;

$\phi_j(\overline{x_j})$ - output value of *j*-th element when the image is submitted to the input;

$\overline{x_k}$ - images of the instructive class sample *r*, the sum of the outputs is maximum for them.

This function determines how much this element ϕ_j distinguishes the class *r* from the training images of all other classes. The initial rule strategy is to maximize the values e_j for all hidden network elements. The first stage of the calculating efficiency provides finding of the values which this neuron picks up in each class. Then the maximum value is selected among these quantities and correlated with the total activity of the radial element. The great advantage of this function is the following - it does not require knowledge of the output weights (Kathirvel et. al., 2019). Thus, it is possible to improve the centers and deflections of the elements without developing the input parameters in the enterprise, which greatly reduces the average time of one iteration.

The above function (4), unfortunately, does not meet these requirements. Its use in the input space implies minimums which the element seeks to occupy. As much as possible, the duplication degree of two radial elements ϕ_i and ϕ_j is expressed as the orthogonality of the vectors of the normalized activities of these elements on the initial sample images:

$$R_{ij} = \frac{\sum\limits_{k=1}^{K} \phi_i(\overline{x_k})\phi_j(\overline{x_k})}{\sqrt{\sum\limits_{k=1}^{K} \phi_i^2(\overline{x_k})\phi_j^2(\overline{x_k})}}$$

(5)

Note that if the radial elements aren't intersected, then R_{ij} equals to zero (i equals to one if work of neurons is completely identical). Accurately calculation of the orthogonality activities for all pairs of elements is quite a time-consuming procedure. Therefore, it's needed a compromise solution requiring much smaller calculations: we will only use the maximum activity condition for each of the radial elements ($p \ll K$) to determine excessively competing elements; *p* often equals to 1 or 2, and others are equal to zero. If the result is not zero, then elements ϕ_i and ϕ_j are considered as duplicates.

The given block of formulas defines a methodical approach concerning introduction of a neuro-fuzzy regulator in business activity. At the same time, there is a need to determine the basic set of risks and threats to the development of business stabilization of a particular business entity in order to select a clear neural regulator or their composition for further use and business effects.

The main distinguishing features of an adaptive entrepreneurial development model are the presence of subjective expert's knowledge (represented by a set of linguistic rules) and development procedures based on objective data from the subject area (see Weiß and Sen, 1996). Note that the development procedure for the model of adaptive

neuro-fuzzy controller allows to automate the selection process of internal parameters of the controller, depending on the "quality" of external parameters (Fig. 2).
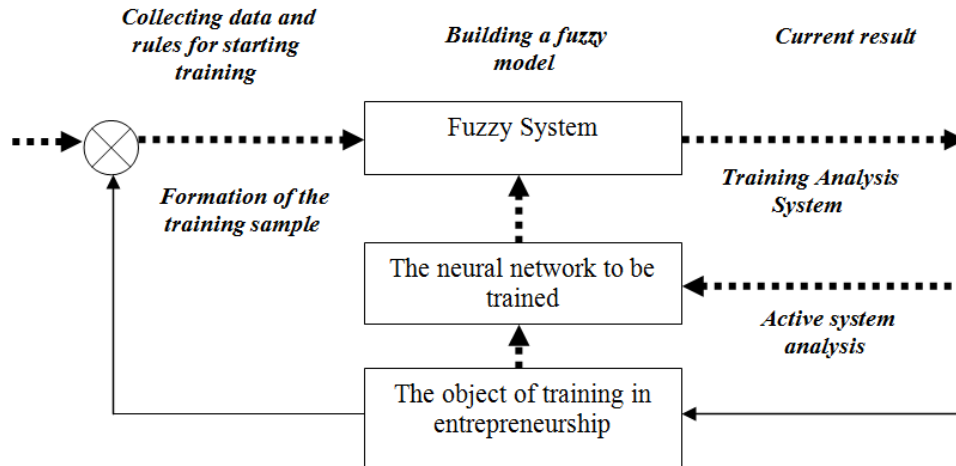
Figure 2. Architecture of the adaptive neuro-fuzzy regulator development in entrepreneurship
Source: the authors

A logical structure of entrepreneurial development is formed at the first stage, which establishes a set of linguistic rules by an expert. Describing a specific set of rules, the expert thereby sets out a strategy to achieve the goal of the system (for example, for a management task, the goal may be successful management of entrepreneurial development) (Metelenko et. al., 2019).

At the second stage the designed system of adaptive development is considered as an adaptive network with a fixed structure and corresponding set of changing parameters, its values can be changed by the genetic algorithm of parametric development of neural networks based on the used real assessments of the work quality by the algorithm.

From a functional point of view, the genetic algorithm (GA) is an active "black box". GA uses an analogue of a biological individual and its natural genotype for implementing a genetic mechanism of the useful information accumulation and search. If a priori data from the external environment are absent, GA searches for the highest evaluated solutions, based only on the estimates of the solutions previously offered by them (Olsher, 2015).

Distinctive properties of the solution (individuals) are stored in a special data set – the artificial chromosome which creates the genotype of the individual. In this model, which optimizes the process of management, the quality criterion – K is used as the criterion for solving the optimization problem, the set of Pj values, ie the tuning parameters is used as an artificial intelligence individual. The values of Pj are encoded in the chromosome by the distinguishing properties of the solution of the problem and they are proposed to be considered as a set, which we denote as P. Artificial intelligence initialized by a specific set of tunable parameters values P_j, set of P_j, parameter values P is the coded in chromosome distinctive properties of the solution

For the case of a fuzzy controller, the genetic algorithm can be used to calculate the values of W_i of linguistic rules based on statistics about results of the common activity of the fuzzy controller and the object of the entrepreneurial development. Obviously, the optimal values of the weights W_i will be the values which characterize the minimal difference between the estimates of the artificial intelligence work and the real estimates.

Then the objective function is calculated based on the Euclid distance between the vector formed by the set of estimates provided by the development system and the vector consisting of real estimates by the following formula:

$$\overline{Y} = \frac{1}{D} \sqrt{\sum_{i=1}^{D} (Y^d - R^d)}$$

(6)

$\overline{Y}$ – target function;
Y^d – estimate predicted by the development system for the solution d;
R^d – real estimate for the solution d;
d – decision number;
D – number determining the number of solutions (number of GA attempts to find the optimal solution).

Thus, the vector of weights significance W_i serves as the set of optimizable parameters. The specific set of values W_i determines some solution of the optimization problem (individual) stored in the GA chromosome. The automatic management system is formed from the object of development (OS) and the adaptive neuro-fuzzy network. The current status of the OS S_i enters the input at each moment of time t_i. Based on it the artificial intelligence forms the action F_i, which enters the OS and thereby close the feedback. The goal of the neuro-fuzzy process is to bring the OS from its current status S_i to the target state S_{tar} through the management action F_i. The management carried out by a neuro-fuzzy network depends on its logical structure, as well as the values taken by the many customizable parameters presented in it. If the logical structure of the neuro-fuzzy network can be completely determined based on the entrepreneur's knowledge of the OS management, then the values of the tunable parameters are only identified approximately (Talatahari et. al., 2012).

As a result, opportunity of improvement the work of the artificial intelligence model is arisen by finding a set of parameters values of the neuro-fuzzy network, quality optimizing some criterion – K management of OS.

Calculation of the quality assessment of the neuro-fuzzy network is realized by the block calculator of the development criterion. This calculator has ability to initiate a sequence from N tests of the work of the neuro-fuzzy network. At the beginning of each test, an OS is initialized by some initial status S^0_k, after the functioning of an OS is simulated under artificial intelligence, during this process it tries to bring the system from its initial status S^0_k to the target S_{tar}. The development system monitors the status of OS S^i_k at each moment of discrete time t_i. Based on these observations, the development system calculates the assessment of the work quality of the neuro-fuzzy network in the test (taking into account success, speed and accuracy of aspirations S^i_k to S_{tar}). The criterion value K_j, corresponded to the tested parameter set P_j in the neuro-fuzzy network, is calculated as an integral estimate with relatively to the estimates calculated in the individual tests.

The process of optimization of the adaptive neuro-fuzzy network is divided into cycles, each of them evaluates one variant of the optimization problem solution defined by some set of parameter values P_j. The following actions are performed in each cycle: GA issues another estimated set of parameters values P_j which initiated the artificial intelligence block.

The search process implemented by GA tends to find and make better solutions in optimization cycles. Thus, after a certain number of optimization cycles, an optimal set of values P_{opt} having maximized K can be obtained. In this case, management carried out by a set of values P_{opt} initialized, will be optimal in the sense of the entered criterion of quality management K.

Studies in the development of real models have shown that the second (stochastic) method is more acceptable for real objects. The formulas for calculating the criterion *K* can be determined in the case of an arbitrary OS. It is necessary: to highlight a subset of the initial status variables in a set of OS status variables; to attribute weights of relative importance to them; to express the goal of management over the value of OS status variables and to introduce an algorithm for setting initial OS statuses in tests by any of the above methods (March, 1991).

The chromosome is a bit-bit grid broken down into sections. Each section has a certain parameter, such as the weight of the linguistic rule W_i. In general, the chromosome encodes the initial set of weights, i.e. parameters of the tunable neuro-fuzzy system. It is obviously that each parameter W_i corresponds to several bits of the chromosome for the numerical representation of this parameter and, thus, the search range for the parameter representation. Different combinations of the parameter values cannot exceed the range. In the general case, the order of the presented parameters, their number and the bit of each parameter may vary at the initial chromosome task, but in the future, the accepted representation of the encoding information in the form of a chromosome remains unchanged (De Lange, 2015). Considering the accepted method of encoding individual parameters, the complete chromosomal set is a sequence obtained by combination of bit representations of some number *n* of the tunable parameters, as shown in Fig. 3.
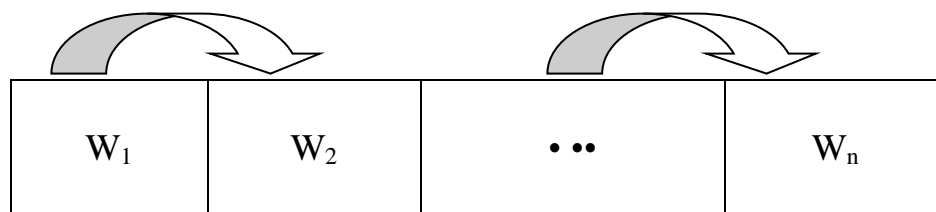
Figure 3. Bit sequence of encoding by the chromosome parameters of the neuro-fuzzy entrepreneurial development (Mallonas, 1994)

The GA procedure operates with multiple chromosomes (population of individuals), modeling the "natural tools" of evolution: competition of individuals, reproduction of individuals with the inheritance of the genes of the parents in the descendants, gene mutation.

The essence of the genetic search procedure for the adaptive neuro-fuzzy regulator in business education proposed in the paper is as follows.

1° To generate randomly the initial plural population of *n* chromosomes.
2° To evaluate each chromosome of the population using a target function (optimization criterion). The evaluation of each chromosome is done by decoding the neuro-fuzzy controller into a set of parameters values, initialization of the neuro-fuzzy controller by the obtained set of parameters, conducting tests according to the algorithm of entrepreneurial development and calculating the value of the criterion K_j which is estimation of the chromosome.
3° To break the population of individuals into random pairs and to generate two descendants from each pair by the use of crossover operators with probability p_c and mutations with probability p_m. Dividing population into random pairs is implemented by performing *n* random paired permutations in the list of population's individuals and further merging into pairs of neighbors on the list, for example (*1-2, 3-4, ..., n - l - m*). Generation of the descendants' pair is carried out in two stages. The first stage determines the occurrence of a random event relative to the crossover, based on the probability p_c.

The crossover and mutation operators work with the chromosomes as a homogeneous bit sequence, without isolating fragments representing individual parameters of the neuro-fuzzy system. The crossover operator has two parental chromosomes at the input and generates two descendants' chromosomes constructed from the genes (bits) of the parental chromosomes. Figure 4 explains the content of a "simple one-point crossover".

4° To evaluate received n descendants using the target function. The assessment is made in a similar manner to the method described in item 2.

5° To choose n the best individuals for the next generation from joint variety of the sizes $2n$ of parents and descendants.
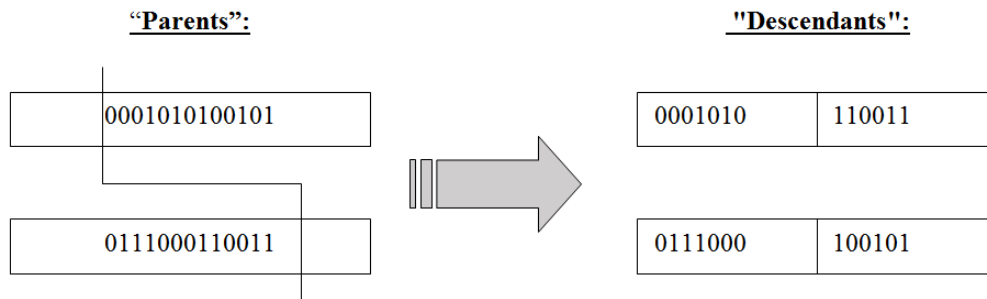
Figure 4. Model of a one-point crossover in the artificial intelligence system

The "softness" of selection is needed to prevent premature convergence of the algorithm to a solution in which the global optimum can be missed due to the small number of GA iterations. The 'roulette' mechanism does not guarantee that the best decision in the population will be preserved in the next generation (Schuhmacher & Kuester, 2012).

6 ° The end of the procedure in case of its completion, otherwise transition to item 3. The fact of the achieving an estimate of the best chromosome in the current population is considered as the main condition of completion, as well as the condition of stopping the algorithm for exceeding the specified number of iterations N_{max} of the genetic algorithm is taking into account.

As a result, the novelty of the study is the neural network model in entrepreneurial development through which the business entity can model variations in the development of entrepreneurial initiatives, identify strengths and weaknesses of new projects, and compare alternative business options in terms of profitability and costs.

5. Discussion

Prospective recommendations in the field of entrepreneurship and artificial intelligence can be formed in the context of the model synthesis of the neuro-fuzzy execution of the functional equivalence procedure of the basic elements of fuzzy networks and artificial neural networks. This approach will help to formulate the task of the model synthesis of the adaptive neuro-fuzzy regulator. Such model will allow to transform the neural network development algorithm into a fuzzy system in the future and, thus, to use neural network optimization algorithms for fuzzy systems in business education. The main distinguishing features of the adaptive model are the presence of subjective expert's knowledge and development procedures based on objective data from the subject area.

Conclusions

It is determined that the fuzzy model of the regulator integrates the capabilities of the fuzzy system to incorporate knowledge in the form of linguistic rules set by the entrepreneur in the process of beginning development. The optimization process leads to the need to take into account the interplay of not only linguistic rules on the efficiency of the fuzzy controller, but also the interplay of fuzzy parameters within one rule. The variant model of the neuro-fuzzy controller proposed in the paper allows integration of the fuzzy system capability to incorporate entrepreneur knowledge in the form of linguistic rules, as well as possibility of neural networks to develop.

A set of rules for the use of the fuzzy choice was formed, which will allow considering the result of the fuzzy choice as an investment of the fuzzy factor in the criterion space as a set of fuzzy one-dimensional criteria that characterize the state of the entrepreneurial system at certain intervals. A methodological approach to fuzzy choice has been developed, in which the choice function is formed from the choice functions for individual fuzzy relations, and the choice can occur in several stages. The mechanism of sequential fuzzy choice and the mechanism of parallel fuzzy choice are formally defined.

References

Axelrod, R. (1997). The complexity of cooperation: Agent-based models of competition and collaboration. Princeton, NJ: Princeton University Press.

Bostrom, N., & Yudkowsky, E. (2011). The ethics of artificial intelligence. In K Frankish, WM Ransey (Eds.), Cambridge handbook of artificial intelligence, (pp. 316–334). Cambridge, UK: Cambridge University Press.

Dejoux C. Léon E. (2018). Métamorphose des managers. 1st edition. France: Pearson.

Cerutti, F., Giacomin M., Vallati M. (2019). How we designed winning algorithms for abstract argumentation and which insight we attained. Artificial Intelligence, 276, 1-40

Choe, H. & Jordan, J.B. (1992). On the Optimal Choice of Parameters in a Fuzzy C-means Algorithm, Proc. IEEE International Conference on Fuzzy Systems, San Diego, 349-354.

De Lange, C. (2015). Welcome to the bionic dawn. New Scientist, 227(3032), 24–25.

Galbraith, J. (2014). Organization design challenges resulting from Big Data. Journal of Organization Design, 3(1), 2-13.

González, V.M., Robbes, R., Góngora, G., Medina, S. (2015). Measuring concentration while programming with low-cost BCI devices: differences between debugging and creativity tasks. In Foundations of augmented cognition, (pp. 605–615). Los Angeles, CA, Springer International Publishing.

Drobyazko S., Barwińska-Małajowicz A., Ślusarczyk B., Zavidna L., Danylovych-Kropyvnytska M. (2019). Innovative Entrepreneurship Models in the Management System of Enterprise Competitiveness. Journal of Entrepreneurship Education, 22(4), https://www.abacademies.org/articles/Innovative-entrepreneurship-models-in-the-management-system-1528-2651-22-4-408.pdf

Drobyazko S., Okulich-Kazarin V., Rogovyi A., Goltvenko O., Marova S. (2019). Factors of Influence on the Sustainable Development in the Strategy Management of Corporations. Academy of Strategic Management Journal. 18(Special Issue; Title: Strategic Research Directions) URL: https://www.abacademies.org/articles/Factors-of-influence-on-the-sustainable-development-in-the-strategy-management-of-corporations-1939-6104-18-SI-1-439.pdf

Kathirvel, V., Asyraf Mansor, M., Shareduwan, M., Kasihmuddin, M., Sathasivam, S. (2019). Hybrid imperialistic competitive algorithm incorporated with hopfield neural network for robust 3 satisfiability logic programming. IAES International Journal of Artificial Intelligence (IJ-AI), 8(2), 144-155

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Kornienko, A.A. Kornienko, A.V. Fofanov, O. Chubik, M. (2015). Knowledge in artificial intelligence systems: searching the strategies for application. Procedia - Social and Behavioral Sciences, 166, 589-594.

Kwilinski, A., & Kuzior, A. (2020). Cognitive Technologies in the Management and Formation of Directions of the Priority Development of Industrial Enterprises. Management Systems in Production Engineering, 28(2), 133-138. https://doi.org/10.2478/mspe-2020-0020

Luckin, R. (2017). Towards artificial intelligence-based assessment systems. Nature Human Behaviour, 1(0028). http://doi.org/10.1038/s41562-016-0028

Maderer, J. (2016). Artificial intelligence course creates AI teaching assistant. Georgia Tech News Center, 9 May 2016. http://www.news.gatech.edu/2016/05/09/artificial-intelligence-course-creates-ai-teaching-assistant

Makedon, V., Kostyshyna, T., Tuzhylkina, O., Stepanova, L., Filippov, V. (2019). Ensuring the efficiency of integration processes in the international corporate sector on the basis of strategic management. Academy of Strategic Management Journal, Volume 18, Special Issue 1, 2019: URL: https://www.abacademies.org/articles/Ensuring-the-efficiency-of-integration-processes-in-the-international-corporate-sector-on-the-basis-of-strategic-management-1939-6104-18-SI-1-452.pdf

March, J. G. (1991). Exploration and exploitation in organizational learning. Organization Science, 2, 71–87.

Metelenko, N.G., Kovalenko, O.V., Makedon, V., Merzhynskyi, Y.K., Rudych, A.I. (2019). Infrastructure security of formation and development of sectoral corporate clusters. Journal of Security and Sustainability Issues 9(1), 77–89. http://doi.org/10.9770/jssi.2019.9.1(7)

Mirjalili, S. (2019). Evolutionary Radial Basis Function Networks. in Studies in Computational Intelligence, 105–139. https://doi.org/10.1007/978-3-319-93025-1_8

Olsher, D.J. (2015). New Artificial Intelligence Tools for Deep Conflict Resolution and Humanitarian Response. Procedia Engineering, 107, 282-292.

Petruzzi, N.C., Dada, M., (2002). Dynamic pricing and inventory control with learning. Naval Research Logistics 49, 304 – 325.

Powell, M. J. D. (1992). The theory of radial basis functions approximation, in Advances of Numerical Analysis Oxford: Clarendon Press

Ratten, V.; Ferreira, J.J. (2016). Sport Entrepreneurship and Innovation, 1st ed.; Taylor & Francis: New York, NY, USA.

Russell, S.J., & Norvig, P. (2010). Artificial intelligence: a modern approach, (3rd ed.). Upper Saddle River: Prentice-Hall.

Schuhmacher, M.C., Kuester, S. (2012). Identification of lead user characteristics driving the quality of service innovation ideas. Create Innovation Management, 21, 427–442.

Seifollahi, S., Yearwood, J. and Ofoghi, B. (2012). Novel weighting in single hidden layer feedforward neural networks for data classification. Computers & Mathematics with Applications, 64(2), 128–136.

Skute, I. (2019). Opening the black box of academic entrepreneurship: A bibliometric analysis. Scientometrics, 24, 1-29.

Snow, C.C., Fjeldstad, Ø.D., Langer, A.M. (2017). Designing the digital organization. Journal of Organization Design, 6(7), 1-13

Talatahari, S., Azar, B.F., Sheikholeslami, R. and Gandomi, A.H. (2012). Genetic algorithm combined with chaos for global optimization. Communications. Nonlinear Science and Numerical Simulation, 17(3), 1312-1319.

Walker, I. (2010). Research Methods and Statistics: Palgrave Insights in Psychology Series, 1st ed. New York: Palgrave Macmillan.

Weiß, G. and Sen, S. (eds.) (1996). Adaptation and Learning in Multiagent Systems, Springer Verlag, Berlin.

Whitehead, B.A. and Choate, T. D. (1994). Evolving space-filling curves to distribute radial basis functions over an input space. IEEE Transactions on Neural Networks, 5(1), 15-23

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Aknowledgements

Sergii BOGACHOV, Doctor of Economic Science, Professor, PO "Institute for Local and Regional Development
ORCID ID: orcid.org/0000-0002-8938-0315

Aleksy KWILINSKI, Ph.D., Habilitated Doctor in Economics, The London Academy of Science and Business, London, England
ORCID ID: orcid.org/0000-0001-6318-4001

Boris MIETHLICH, PhD, Faculty of Management, Comenius University in Bratislava, Slovak Republic
ORCID ID: orcid.org/0000-0003-4064-6722

Viera BARTOSOVA, Ph.D in Economics, Associate Professor, University of Zilina, Slovak Republic
ORCID ID: orcid.org/0000-0001-7960-4429

Aleksandr GURNAK, PhD, Associate Professor, Financial University under the Government of the Russian Federation
ORCID ID: orcid.org/0000-0002-4514-6885

LEVEL OF ADMINISTRATIVE EMPOWERMENT AT PRIVATE INSTITUTION AND ITS IMPACT ON INSTITUTIONAL PERFORMANCE: A CASE STUDY

Ahmad Ismail Al Maani [1], Ahmad Al Adwan [2], Ahmad Yousef Areiqat [3], Ahmad M.A. Zamil [4], Anas A. Salameh [5]

[1]Department of Higher Education, Modern College of Business & Science, Oman
[2] Marketing Department, Business School, Al-Ahliyya Amman University, Jordan
[3]Department of Business Administration, Business School, Al-Ahliyya Amman University, Jordan
[4]Department of Marketing, College of Business Administration, Prince Sattam bin Abdulaziz University, Saudi Arabia
[5]Department of Management Information Systems, College of Business Administration, Prince Sattam bin Abdulaziz University, Saudi Arabia

E-mails: [1] ahmed.almaani@mcbs.edu.om ; [2]a.aladwan@ammanu.edu.jo; [3]ahmadareiqat@ammanu.edu.jo; [3]am.zamil@psau.edu.sa; [4]a.salameh@psau.edu.sa

Abstract. The study aims to scrutinize the level of administrative empowerment involving its dimensions (delegating powers/devolution of authorities, independence, learning, and training) on institutional performance (commitment to quality standards, achieving the goals, and staff performance) of Al-Ahliyya Amman University (AAU). The researchers applied the descriptive-analytical method by developing a questionnaire that was distributed among a simple random sample consisting of (200) members, and the data were analyzed, and the assumptions were tested using the statistical program (SPSS v20). The findings of the study revealed that there was a statistically significant impact of the level of administrative empowerment including its combined dimensions on the institutional performance at AAU. Furthermore, there was a statistically significant impact of the level of administrative empowerment involving its combined dimensions on the commitment to quality standards at AAU. The researchers recommend adopting a strategy that achieves the implementation of modern management concepts at AAU such as career empowerment, Total Quality Management (TQM), and teamwork, as well as focusing on the qualification of AAU staff. Such training will help workers practice career empowerment through the implementation of specific action plans for developmental purposes, the development of annual training plans, the use of effective means such as lectures, and motivating employees to participate in training courses and activities.

Keywords: administrative empowerment; devolution of authorities; job satisfaction; decentralization; institutional performance; teamwork

1. Introduction

Administrative empowerment is a contemporary concept that seeks to raise and develop individuals' capacities and skills to solve their managerial problems and offer them opportunities to initiate and challenge; by encouraging them to shoulder responsibilities for the decision-making, cooperation, and participation to achieve the desired goals. Moreover, administrative empowerment is considered an effective strategy that enhances managers' performance, as they have a high level of capacities and skills in addition to job satisfaction towards their organizations and careers. This will be maintained by providing them with full freedom at work to think and act independently under the umbrella of administrative decentralization methodology (Khalayleh, Masa'deh &Al-Lozi, 2017). Administrative empowerment is based on building-up trust between the workers and their leadership and encouraging them to participate in the decision-making process, in addition to breaking administrative and organizational barriers between the leadership and the staff. It also incorporates offering workers the freedom to act and enhances their participation in decision-making, and thus it guarantees the quality of the leaders' performance in administrative implementation and creativity at the same time. The typical result of administrative empowerment is represented in helping the administrative leadership obtain the uttermost benefit from the available human and material resources in their institutions to accomplish the desired goals of their organization and thus the outcome will be a higher level of job satisfaction. (Al-Omari et al, 2020). Since organizations are seeking to keep pace with the trend towards growth and development, they have to respond to the requirements for applying the principles of open management, decentralization, the delegation of powers/ devolution of authorities besides participating in decision-making to enhance the level of knowledge, skill, and administrative professionalism and improve institutional performance. Effective performance is a part and parcel of the enterprise system and is one of the most important programs that aim to achieve the goals of the organization, and it is also very essential to improve and enhance performance and upgrade the level of workers. (Uddin, 2017). Decentralization is a modern reform process that is embraced by many sectors with different types of business, and modern companies have adopted a decentralized hierarchy, which is expected to raise the level of creativity among employees. However, the tendency towards decentralization must be properly applied, restrictive, and a limited process. Excessive decentralization may create a state of chaos in the company (Thomas & Priyanka, 2014). In light of the importance of institutional performance and the role of administrative empowerment in achieving necessary skills to improve employees' performance and the devolution of authorities that enable them to solve problems practically and efficiently, this study seeks to identify the level of administrative empowerment in institutions and detect its impact on institutional performance at the AAU. The gap in previous researches is the impact of administrative empowerment on institutional performance. Administrative empowerment concerns raising and developing individuals' capacities and skills. Moreover, it can be employed by applying modern management concepts such as career empowerment, (TQM) and teamwork, as well as focusing on the staff qualification. One of the biggest challenges that most of the firm's face is the centralization of powers which delay and slowing down organizations from achieving its tasks, activities, and interest. Administrative empowerment is a very promising area for most of the organization. Thus, to fill this gap, this research aims to determine the impact of administrative empowerment including its dimensions (delegating powers/devolution of authorities, independence, learning, and training) on institutional performance in the AAU into the Jordanian context.

2. Problem and Questions of the Study

Empowering workers brings many benefits to the organization as it works to develop managers 'way of thinking, develop their creative capabilities, and allow more time for them to focus on strategic matters, develop visions, formulate long-term mission and goals, and draw long-term plans (Al-Maghribi, 2001). To the essential impact of applying the strategy of empowering workers to the success of the organization, because empowerment is an inevitable response to achieving the comprehensive quality requirements. The researchers believe that one of the phenomena of the administrative problems is the tendency of academic leaders in universities to concentrate power and not delegate it to their subordinates. Which causes a low spirit of enthusiasm and satisfaction among workers and thus, contributes to weakening the institutional performance. The phenomenon of centralization of powers or authorities among senior officials is considered one of the most important administrative problems facing institutions, as it leads to the sluggish implementation of organizations' tasks and activities. This phenomenon also entails paying more attention and preoccupation to routine work rather than the important administrative work involving basic tasks of the departments and the leadership such as planning, development, monitoring the progress of the institution, and policymaking. The administrative empowerment process is an inevitable action that is performed to maintain smooth and continuous implementation of various procedures and work practices in administrative units. Also, administrative empowerment allows senior management to make better use of its time rather than being engaged in routine work, and it also contributes effectively to the process of developing and improving the decision-making styles. The problem of the study lies in the fact that many institutions in Jordan are still so dependent on centralization, as they do not enable workers to perform administrative tasks, and not allowed to take part in decision-making despite the recommendations of many studies such as (Radhy, 2010, Al-Ajrafi, 2017, Al-Suhimat, 2016) to focus on the importance of administrative empowerment in improving creativity, achieving job satisfaction, and organizational creativeness in various institutions. The research problem is mainly focused on the phenomenon of the inclination of administrative leadership in institutions towards the centralization of their authorities rather than delegating power to their subordinates. Such tendency has some negative effects facing service institutions, and this is reflected in employees' enthusiasm to work sincerely and reduces the degree of job satisfaction among workers, and thus, leading to poor institutional performance. This study has been conducted to detect the degree of administrative empowerment of managers involving (delegating powers/devolution of authorities, independence, learning, and training) at the AAU. Moreover, the researchers aim to address the level of institutional performance including (Commitment to quality standards, achieving the goals, and staff performance) at the AAU. The study also aims to determine if there is an impact of administrative empowerment on institutional performance at AAU and identify if there are any significant statistical differences in the level of administrative empowerment on institutional performance AAU that could be attributed to demographic characteristics.

3. Significance of the study

The significance of the study is attributed to the importance of improving the level of performance in AAU through ascertaining the level of administrative empowerment and explaining its impact on the competency of institutional performance.

4. Objectives of the study

This study aims to detect the importance of administrative empowerment and its impact on the institutional performance of the AAU, including the following targets:

1- Identify the reality of the level of administrative empowerment and institutional performance at AAU.

2- Reaching results and recommendations that contribute to achieving and distinguishing institutional performance by improving the level of administrative empowerment

3- Analyzing the impact of administrative empowerment on institutional performance at the AAU.

5. Procedural Definitions of the study terminology

Administrative empowerment is defined as "the process of offering individuals greater authority to experience monitoring, shoulder responsibility, and invest their capacities, by motivating and encouraging them to make decisions and take personal responsibility to develop the way through which they perform their work and tasks by devolution of authorities to empower them in taking decisions at the lowest level (Al-Abdullah, 2018:16). Administrative empowerment is also represented in "Paying more attention to workers by expanding their authorities or influence, enriching the amount of information given to them, increasing opportunities given to them to take initiatives and make decisions and confront problems that impede their performance" (Al-Ajrafi, 2017: 155). Administrative empowerment is also known as "The relationship between risk-taking, daring and flexibility and the ability to persuade others, as well as using the scientific methodology to think and solve problems and this is one of the most creative behaviors of workers" (Radhi, 2010: 67).

Decentralization is defined as "The delegation of authorities/devolution of authorities for the lowest levels of positions, and it reflects the extent of the management's ability to distribute tasks within its authorities among its sub-ordinate personnel or other multiple entities across various administrative levels in a way that allows them to participate in the decision-making process, and to manage administrative issues of the organization" (Radhi, 2010, p. 15). Institutional performance is defined as "the extent to which the organization's goals are pursued and achieved" (Qalbo, 2015: 35). Accordingly, researchers find that the most important axes of the administrative empowerment process are the following: education, training and delegation of powers.

6. Previous Studies/Literature

A study conducted by (Al-Abdullah (2018: 16), aimed at exploring the dimensions of administrative empowerment and determine the degree of its implementation from the perspective of workers at HP in Saudi Arabia. The findings showed that there was a statistically significant effect from the perspective of HP employees in Saudi Arabia, relating to the "impact of devolution of authorities", "teamwork", "training" and "motivation" as the dimensions of empowering workers in its influence on improving professional performance. The researcher recommended that the company should strengthen communication ties among administrative various levels and maintain dependence on teamwork to accomplish required job tasks.

Al-Ajrafi's study (2017) aimed to identify the status of administrative empowerment of heads of faculty departments in Shaqra'a University in Dwami and its correlation with achieving job satisfaction. The findings revealed that there was a high and significant correlation between administrative empowerment and job satisfaction, and the researcher recommended give more attention to developing the capacities of heads of administrative departments to empower them to perform their job tasks successfully.

Al-Madadha (2016) made a study to discuss the effect of (empowerment of leadership, the environment of empowerment and psychological empowerment) and their impact on the creative and professional performance of employees. The researcher focused on detecting if there was any possible correlation between the integrative approach of empowerment and the creative performance of employees. The results indicated that there was a positive impact of the empowerment of leadership on the empowerment environment and psychological empowerment. Similarly, the empowerment environment has had a positive effect on psychological empowerment, and also the psychological empowerment has a positive impact on the creative performance, besides the importance of empowerment and its effects on the creative performance of employees.

Jiang, Flores, Leelawong, and Manz (2016) aimed to study the effect of the relationship between empowerment and team performance by focusing on the mechanisms of knowledge interchange and conflict within the group. The results showed that team empowerment can increase knowledge interchange and conflict within teams or groups work and that knowledge sharing facilitates team performance, while conflicts within a group weaken the public. (Al-Suhimat, 2016) aimed to analyze the impact of administrative empowerment on organizational creativity of workers in Mu'tah University, Jordan The researcher advised that the University of Mu'tah should pay attention to the concept of administrative empowerment and take policies and procedures that raise the level of awareness of this concept among employees by holding training courses for this purpose.

Abu Ruman, (2016) conducted a study to identify the impact of administrative empowerment on improving workers' creativity at Jordan Private Administration Institute (JPAI). The findings of the study indicated that there was a statistically significant impact of administrative empowerment (devolution of authorities, staff training, effective communication, and employees' motivation) on creativity improvement among employees in JPAI. The study recommended applying modern managerial concepts such as activating the principle of participation, working in groups, forming a team, and taking administrative decisions.

Shaqoura (2015), exploring the degree of the attention and interest given by secondary schools' principals in Gaza governorates to the requirements of administrative empowerment and their correlation with their achievement culture. The study concluded that the administrative requirements came in the highest ranks, followed by the organizational requirements and finally the logistic requirements. There were no statistically significant differences detected for the requirements of administrative empowerment that can be attributed to the variables of (gender, years of service/experience, and the educational qualification).

Aseeri and Al-Dhamen (2015) conducted a study aimed to explore the impact of job empowerment on improving their performance. The study revealed that there was a statistically significant effect of the dimensions of job empowerment (independence and freedom to act, sharing information, and management support) on improving employees' performance and the impact of the degree of performance improvement as a whole through the degree of job empowerment.

A study of Al-Qurashi (2014), aimed to identify the effect of empowering workers for the sake of improving job performance in health institutions in Taif. The results indicated that there were no statistically significant differences between the opinions of workers in health institutions in Taif, Saudi Arabia (including the physician, the nursing staff, and other workers) on the dimensions of (empowering employees, clarity of the purpose, ethics, recognition, and appreciation, teamwork, and participation). The findings also showed that there were no statistically significant differences from the perspective of workers in health institutions in the city of Ta'if relating to (clarity of purpose, participation, ethics, recognition, appreciation, and teamwork) as these include the dimensions of empowering workers and have an impact on improving their level of job performance.

Al-Ta'ani and Al-Suwai'i (2013) conducted a study aimed to identify administrative empowerment and its relationship to job satisfaction among principals of public schools in Dammam Governorate, Saudi Arabia. The findings indicated that there was a strong positive correlation between the degree of administrative empowerment and the degree of job satisfaction. The researchers recommended that job satisfaction should be given priority among other issues and receive more attention from the AAU of Education and give them more material and moral incentives for workers to maintain their job satisfaction.

Chen (2011) tried to explore the relationship between empowerment and employees' performance in the Malaysian auto industry and the effect of empowerment on employees' performance to determine which of the four empowerment dimensions had the greatest impact on employees' performance. Four dimensions were considered independent variables including (empowerment, competency, self-determination, and influence) whereas employee performance was the dependent variable. The results indicated that workers in the automotive industry think that empowerment strongly affects their performance and that there is a significant correlation between the dimensions of empowerment and employees' performance. They feel that their performance will greatly improve when they are independent, free, and have opportunities to influence the decision-making process in their work or their organizations.

Radhi (2010) study aimed to determine the relationship between administrative empowerment represented by its dimensions (delegation/devolution of authorities, teamwork, training, effective communication, and motivation) and the creativity of workers that includes (risk-taking, flexibility, persuasion, and scientific methodology in thinking and problem solving). The study revealed that there was a relationship between administrative empowerment and employees' creativity in addition to the existence of partial support for administrative empowerment correlation with most variables relating to employees' creativity. The researcher recommended that strategic leadership in the college should continue its policy in giving more attention to administrative empowerment to increase the level of workers' creativity in the areas where the response to administrative empowerment variables was reported.

Arieqat (2009) argues that empowerment is a transfer of responsibility and authority, and an invitation for workers to share the knowledge and information provided by the organization through its database, in problem analysis, and in decision-making, which lies within the decision-making authority. So, the subordinate will be responsible for the quality of what he/she decides to do, or what type of job to perform which leads to transferring the authority relatively, from the boss to the sub-ordinate employee.

Carter (2009) conducted a study to detect the relationship between organizations' behavior and the degree of employees' empowerment. The findings of the study showed that most workers were more productive if they were empowered by their management, and almost all organizations emphasized the importance of measuring employees' performance and boosting it. Also, many of these companies have realized that employees who participate in their activities actively contributed to supporting their managers 'decisions. Moreover, encouraging employees to shoulder more responsibilities enhances their productivity and contributes to raising morale and commitment, and empowerment contributes to promoting innovation, creativity, and motivation and instills common values and creates an environment for learning and achievement.

Emerson (2008), aimed to find out the reasons that make employees' empowerment an issue that is not merely an aphorism or a buzz word, but it is a process that achieves job satisfaction and enhances workers' performance and thus helps accomplish the company's goals. The study stressed that administrations should be keen to practice and

encourage the method of empowering employees while keeping contact with employees and considering their views. The researcher also called to evaluate the means of mutual communication with their sub-ordinates. Employees should also have the freedom to express their views on the issues that concern them, and this makes them feel proud of the organization's appreciation of their efforts, ideas, and suggestions. As indicated by Rhadi (2010) who proved the direct relationship between creativity and empowering employees. The study population was targeted by selecting a random sample in order to ensure that there is no bias, and for the results to be faithfully expressive of the reality of administrative empowerment at Al-Ahliyya Amman University.

We hypothesize to test the effects of level of administrative empowerment and explaining its impact on the competency of institutional performance AAU. We test the level of administrative empowerment and explaining its impact on the competency of institutional performance AAU. To test our hypothesis. The data was collected from the (200) members working at AAU.

Table 1. Demographic aspects

Gender	Male	Female			
	79.5	20.5			
Age	Below 30	31-39	40-45	46-50	More than 51
	23.0	21.5	31.5	18.5	5.5
Education	Bachelor	High Diploma	Master	PhD	
	50.5	23.0	19.5	7.0	
Experience	0-5	6-10	11-15	More than 16	
	15.0	13.0	30.0	42.0	
Career Level	Senior management	Middle management	Executive management		
	20.5	53.5	26.0		
Job	Director	Deputy Director	Head of the Department	Employee	
	18.0	23.0	33.0	26.0	

Table 1 shows the demographic aspect of surveyed members of the AAU. Table 1 shows that most of management 79.5% were male and most of them 31.5% were from an age group of 40-45 years. Education profile shows that most of the respondents 50.5% are carrying the bachelor's degree and 19.5% and 7% are also carrying the highest degree Master and PhD respectively. To test the level of administrative empowerment and explaining its impact on the competency of institutional performance, data was collected from 20.5% Senior management and 53.5 Middle management and 26% Executive management. Lastly, the experience distribution shows that 42% have more than 16 years' experience and 30% for the experience of 11-15 years.

Table 2. Strength of relationship among the items in each construct

Measurement items		Mean	S.D.
Delegation Authority (DA) My direct manager in the AAU provides me with the necessary information and knowledge related to my job tasks. *(DA1)* The senior management of the AAU delegates some powers to the directors of the departments therein. *(DA2)* My direct manager in the AAU delegates the necessary powers to perform the duties required of me. *(DA3)* I am involved in decisions related to my work. *(DA4)* My line manager provides adequate support and advice on my delegated tasks. *(DA5)*	α: 85.8 *t*-Value: -1.001	4.3145	0.6894

AAU senior management works to give workers responsibility and decision-making. *(DA6)*

The AAU aims to involve all its employees for the success of the work. *(DA7)*

The senior management of the AAU focuses on the procedure whereby its employees are given the authority and authority to solve daily problems that arise during work. *(DA8)*

I have powers to correct deviations when they happen without referring to the immediate boss. *(DA9)*

The higher management of the AAU aims to give individuals greater authority in exercising oversight to increase their capabilities in the decision-making process. *(DA10)*

I have the freedom to perform the tasks entrusted to me and to discuss my ideas with the senior management of the AAU. *(DA11)*

Independence (IN)

α: 83.52   *t*-Value: 0.095

I have the opportunity to be proactive and independent in performing the required tasks. *(IN1)*

My line manager at the AAU trusts in my practical abilities to take on the responsibilities of my job. *(IN2)*

My position in the AAU provides opportunities to make independent decisions. *(IN3)*

The director of the department delegates sufficient powers to his assistants to accomplish their job duties. *(IN4)*

The line manager specifies the appropriate flexibility for subordinates to act in the performance of their job duties. *(IN5)*

4.1383   0.7169

The AAU is working to provide an appropriate degree of discretion to employees. *(IN6)*

The senior management of the AAU entrusts its employees with a degree of independence while holding them accountable for the results. *(IN7)*

The AAU is transferring enough powers to workers so that they can perform the tasks assigned to them freely. *(IN8)*

AAU's senior management encourages working individuals to take personal responsibility for developing the way they do their work. *(IN9)*

My line manager encourages me to take responsibility by delegating authority to make decisions at the lowest level. *(IN10)*

Learning and Training (LT)

α: 86.76   *t*-Value: 8.971

Staff is trained to cope with developments in the AAU. *(LT1)*

The AAU is working hard to find new ways to train and develop business methods. *(LT2)*

The AAU continuously conducts training courses for its employees. *(LT3)*

Training courses focus on improving the skills and capabilities of workers in the AAU. *(LT4)*

The results of the training courses are evaluated at the end of each training program. *(LT5)*

4.12961   0.6883

The period specified for the plans corresponds to the topics raised in the training program. *(LT6)*

The training material is prepared in light of the needs of the trainees. *(LT7)*

The AAU uses modern training methods to implement training programs. *(LT8)*

The AAU senior management adopts a clear training plan. *(LT9)*

The AAU provides various training courses to develop the skills of its employees. *(LT10)*

AAU employees have opportunities to learn and acquire new tasks in their field of work. *(LT11)*
Training helps to provide employee self-motivation to increase efficiency and improve productivity. *(LT12)*
Training plans are designed to address business problems and avoid any future imbalances. *(LT13)*

Institutional Performance (IP) AAU employees perform the tasks assigned to them according to the required quality standards. *(IP1)* Workers complete job tasks on time. *(IP2)* The AAU is keen to provide specific performance indicators for workers. *(IP3)* AAU employees can initiate and innovate. *(IP4)* The relationship of employees with their superiors is characterized by friendliness and harmony. *(IP5)* Workers are keen to use the capabilities and resources available by the AAU efficiently and effectively. *(IP6)* The AAU seeks to fulfill its obligations to society through service excellence. *(IP7)* The AAU is keen to develop its financial services in line with its social responsibilities. *(IP8)* The AAU seeks to simplify the work procedures. *(IP9)* The AAU is investing a lot of money in the rehabilitation and development of its human resources. *(IP10)* The AAU routinely develops its administrative procedures and technical practice. *(IP11)* The AAU possesses distinguished administrative competencies in the field of its main services. *(IP12)* The AAU carries out an assessment of the needs of the beneficiaries of its services provided periodically. *(IP13)* The AAU provides its services in response to the needs of the public. *(IP14)*	α: 77.82 *t*-Value: 1.066	
	4.1730	**0.70626**

Cronbach Alpha test is applied to test the strength of the relationship among the items in each construct. We find that all dependent and independent variables have Cronbach Alpha at least more than 0.80 except the Institutional Performance (IP) which has Cronbach Alpha 0.77.82. Moreover, our objective is to test the level of administrative empowerment and explaining its impact on the competency of institutional performance AAU. Cronbach Alpha value shows an excellent strength of the relationship. Overall, all the constructs are shown the validity to proceed for further analyses (Table 2).

Table 3. Regression dependent variable is the effectiveness of administrative decisions

Variable	Coeff	SE	t	P
Delegation Authority	-8.84E-02	0.088	-1.001	0.005
Independence	9.954E-03	0.104	0.095	0.001
Learning and training	1.014	0.113	8.971	0.000
Institutional Performance	0.324	0.304	1.066	0.000
The goodness of Fit (F-value)	70.049			0.000
R2	0.517			

The regression's result shows (Table 3) that the effects of **(DA)**, **(IN)**, and **(LT)** on the **(IP)** of the AAU are found positive and significant. So, the AAU efforts for **(DA)**, **(IN)**, and **(LT)** are found very helpful in improving the **(IP)** of the AAU. In comparison, the **(DA)** has the greatest effect on the **(IP)** of the AAU. It means that the AAU inputs in the **(DA)** are important for the **(IP)**. However, the magnitude of the effect of the **(IN) and (LT)**, is also found nearby to the magnitude of the **(DA)**. It means that **(IN) and (LT)**, of the AAU, also does matter equally in the impact of the level of administrative empowerment involving achieving the higher **(IP)**.

Conclusions & Recommendations

1. Focus on training workers at AAU to practice job empowerment, through implementing action plans for development purposes, develop annual plans for training, use effective methods such as lectures, and encourage workers to participate in training programs.
2. Adopt a strategy that realizes the application of modern management concepts in the AAU such as job empowerment, total quality management, and teamwork.
3. Grant rewards for the AAU for the working teams and involve workers in specialized programs on job empowerment.
4. Delegate authorities to employees at the AAU in a balanced manner that is relevant to their responsibilities.
5. Allow workers to participate in the process of decision-making and decision-taking at the AAU.
6. Develop the administrative skills of workers in AAU through raising their knowledge and awareness of modern management concepts.
7. Develop work procedures at the AAU to meet the requirements of job empowerment.
8. Assign a box to receive complaints and proposals from workers at the AAU to express their views and suggestions about the degree of the AAU senior management implementation of administrative empowerment, to what extent it delegates authorities to employees and enables them to behave independently.

Limitations and Future Recommendations

The conclusions derived from the findings of this study need to consider the following limitations:
1) This study was focused on four dimensions of administrative empowerment (delegating powers/devolution of authorities, independence, learning, and training) and did not include other factors that can influence institutional performance, such as knowledge sharing, team empowerment, and power distance.
2) the study questionnaire was distributed randomly to 200 respondents in general, it would give better results if we increase the number of respondents and focus more on the targeted respondents whether they are undergraduate or employed at AAU.
3) it is important to figure out that, when answering the questionnaire, respondents revealed their subjective perceptions which may limit the objectivity of the survey results.
4) the study findings are related to the specific country "Jordan" in which the research was conducted, the results may have limited generalizability a broad, therefore, more studies need to be considered in other regions on different sectors.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

References

Abu-Ruman, N. (2016). Impact of Administrative Empowerment on Creativity Improvement among the Workers of Jordanian Public Administration Institute. International Journal of Business and Social Science, 7(1), 182-190.

Al- Dhamen, Rula (2015). Impact of the Job Empowerment Implementation on Improving Employees' Performance: An applied study on the supervisors of the Education Department, Journal of Financial and Commercial Research, Faculty of Commerce, Port Sa'eed University, 1, 282-303.

Al-Abdullah, Ma'en Ahmad (2018). Empowerment Impact on Job Performance: A study on HP Company in Saudi Arabia, unpublished Master Thesis, Syrian Virtual University.

Al-Ajrafi, Falah, (2017). Administrative empowerment and its correlation with achieving job satisfaction, was conducted on the heads of the departments at the faculties of Shaqra'a University in Al-Dwadmi, Saudi Arabia. Specialized Educational International Journal, 6(9), 152-167.

Al-Madadha, A. (2016). The influence of an integrative approach of empowerment on the creative performance for employees (Doctoral dissertation, Cardiff Metropolitan University).

Al-Omari, Z., Alomari, K & Aljawarneh, N. (2020). The role of empowerment in improving internal process, customer satisfaction, learning and growth. Management Science Letters, 10(4), 841-848. http://doi.org/10.5267/j.msl.2019.10.013

Al-Qurashi, Saleem & Al Hmeidan, Abdullah (2014). Impact of Staff Empowerment on Job Performance Improvement: Applied study on the health services sector in the city of Ta'if", Master Thesis, Faculty of Commerce, Port Sa'eed University, Egypt.

Al-Suhimat, S. (2016). Impact of Administrative Empowerment on Organizational Creativity: An Analytical Study from the Perspective of Employees at the University of Mu'tah in Jordan. Imperial Journal of Interdisciplinary Research (IJIR), 2(10), 70-78.

Al-Ta'ani and Al-Suwai', Hasan Ahmad & Omar Sultan (2013). Administrative Empowerment and its Relationship to Job Satisfaction among Principals of Public Schools in Dammam, Saudi Arabia. Studies of Educational Sciences, 40(1), 305-327.

Areiqat, Ahmad & Naji, Bayan. (2016). The Role of Employee's Empowerment Strategy in Improving Organization's Effectiveness. Dirasat: Administrative Sciences, 161(3988), 1-16.

Areiqat, Ahmad & Zamil, Ahmad. (2011). The role of empowerment in crisis management in business organizations. Asian Journal of Business Management, 3(3), 188-195. Maxwell Science Publishing.

Areiqat, Ahmad Yousef. (2010). Role of Empowerment of Crisis Management in Business Organizations. The Seventh International Scientific Conference. Zerqa Private University.

Aseeri and Al-Dhamen. (2015). The Impact of the Job Empowerment Implementation on Improving Employees' Performance: An applied study on the supervisors of the Education Department at Aseer region, Yemen. Unpublished Master thesis.

Carter, J. T. (2009). Managers Empowering Employees. American Journal of Economics and Business Administration, 1(2), 41-46. https://doi.org/10.3844/ajebasp.2009.41.46

Chen, K. P. (2011). A Study on the Impact of Empowerment on Employee in the Automotive Industry in Malaysia. Unpublished Thesis. Open University Malaysia.

Emerson, A. (2008). Why Employee Empowerment should be more than just a Buzz Word at Your CU. Credit Union Journal, 81.

Khalayleh, Wea'am Aref & Masa'deh, Ra'ed & Al-Lozi, Musa. (2017). Administrative Empowerment and its Role on the Work Teams Performance: A Literature Review. Journal of Social Sciences (COES&RJ-JSS), 6(4), 851-868, October.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Qalbo, Husniyyah, (2015). Role of Knowledge Management in Institutional Performance, unpublished Master thesis, Mohammad Khudeir University, Baskarah.

Radhy, Jawad Muhsen, (2010). Administrative Empowerment and its Relationship to Staff Creativity, a field study on a sample of employees at the Faculty of Management and Economics, Al- Qadisiyah Journal for Administrative and Economic Sciences, 12(1), 62-84.

Shaqoura, Mohammad. (2015). The requirements of Administrative Empowerment of the Principals of Secondary Schools at the Governorates of Gaza and their Correlation with their Achievement Culture. Master thesis, Faculty of Education, Al-Azhar University, Gaza, Palestine.

Thomas, Ammu, & Priyanka, Jenifer (2014). Study of Decentralization in Construction Companies (Kerala), International Journal of Civil Engineering and Technology (Ijciet), 5(12), 235-238.

Uddin, Nasir. (2017). Empowerment through Decentralization: Conceptions, Contrivances and Connections. Dynamics of Public Administration, 34(1), 86-101. https://doi.org/10.5958/0976-0733.2017.00008.6

Xueting, Jiang Hector R., Leelawong, Flores Ronrapee, & Manz, Charles C. (2016). The effect of team empowerment on team performance. International Journal of Conflict Management, 27(1), 62 - 87, http://dx.doi.org/10.1108/IJCMA-07-2014-0048

Ahmad Ismail Al MAANI is the Associate Professor of Business Administration and Director of the Department of Higher Education, Modern College of Business & Science, Oman.
ORCID ID: 0000-0001-5122-749X

Ahmad Al ADWAN is the Associate Professor and Head of Marketing Department, Business School, Al-Ahliyya Amman University, Amman, Jordan.
ORCID ID: 0000-0003-0451-0182

Ahmad Yousef AREIQAT is the Professor, Department of Business Administration, Business School, Al-Ahliyya Amman University. Amman, Jordan.
ORCID ID: 0000-0003-0379-7409

Ahmad. M.A. ZAMIL is the Associate Professor, Department of Marketing, College of Business Administration, Prince Sattam bin Abdulaziz University, Saudi Arabia.
ORCID ID: 0000-0002-3700-8458

Anas A. SALAMEH is the Assistant Professor, Department of Management Information Systems, College of Business Administration, Prince Sattam bin Abdulaziz University, Saudi Arabia.
ORCID ID: 0000-0002-4694-3771

IMPROVING THE SOCIO-ECONOMIC WELL-BEING OF THE POPULATION IN RURAL AREAS IN THE CONTEXT OF IMPROVING THE ECONOMIC SECURITY OF THE STATE

Oleg V. Zakharchenko

Department of Management and Marketing, Odessa State Academy of Civil Engineering and Architecture, 65029, 4 Didrikhson Str., Odesa, Ukraine

E-mail: o.zakharchenko5206@nuos.pro

Abstract. Issues of improving the well-being of the population do not always belong to the category of strategic. In this case, the main value is determined by individual indicators that reflect the development of individual territories or industries. The relevance of the paper is determined by the ability of calculating indicators that form an idea of how well developed the socio-economic program of the territory development. The novelty of the study is determined by the fact that has been developed a model that allows to accumulate a number of formal indicators and thus not only specify the level of development of a particular territory or region, but also indicate the level of participation of private business in the development of socio-economic well-being. The authors include in the model the structure of socio-economic indicators that have a personal basis and can be used to develop programs and systems for computer modelling of the socio-economic development of the territory. The authors show that socio-economic well-being subsequently determines the level of economic security of the population. The practical significance of the study is determined by the capabilities of forecasting and applying indirect models for determining the socio-economic well-being of the population in the conditions of crisis conditions of the economy. It is proposed to use a set of balanced indicators of socio-economic development with a predominance of mathematical modelling patterns based on a set of market data.

Keywords: strategy; model; development; population; well-being

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

1. Introduction

The financial and economic sphere and related processes accompany us at every step of our daily lives (Kline et al., 2007). That is why their study, and especially the study of nonlinear non-stationary processes, requires more and more attention from the scientific community every day (Bryden et al., 2011; Fedotov et al., 2018). In particular, the issues of modelling and forecasting processes that, in the conditions of crisis phenomena of the economy and various external or domestic factors of influence, acquire new features and becoming increasingly relevant (Saqalli et al., 2011; Yessilov, 2015; Salimyanova et al., 2019). To obtain valid mathematical and statistical models, as well as high-quality forecasts, it is necessary to critically analyse, improve and use existing methods, for example, methods based on moving average autoregression (MAA) models, methods of optimal estimation and filtering, the method of group accounting of arguments and many others (Newburn & Berck, 2006). However, in order to achieve a significant improvement of the model and obtain a better forecast, neural networks of various modifications, non-standard regression approaches to modelling can be applied (Rushton, 1992; Bliznets et al., 2018; Pyagay et al., 2014; Bashynska et al., 2019).

The problems of mathematical modelling are becoming increasingly relevant for the effective organisation of management of individual business entities and economic communities due to the fact that the quality of decisions made is largely determined by the quality of forecasting their consequences. Therefore, the decisions made today should be based on reliable estimates of the possible development of the studied phenomena and events in the future (Johnson et al., 2010; Ermilova, 2018; Bashynska et al., 2020).

Forecasting is a tool that represents an opportunity within which realistic objectives for planning a subject's development strategy can be set (Hatherley et al., 2013). During forecasting, mathematical methods are used, which are sometimes quite complex and non-trivial. Due to the widespread use of computers that are easy to understand and use, and most importantly, effective forecasting programs, it has become a fast and fairly effective analysis mechanism (Do & Park, 2018). That is why the search for new or a combination of existing methods allows to get a more accurate and valid model, which in turn provides the opportunity to make effective management decisions (Leinbach & Cromley, 1989).

Today, there are many systems of various nature: environmental, technical, economic and financial, which function and develop under the influence of random disturbances of a different nature. And this in turn leads to the emergence of non-stationary processes – the emergence of a trend and heteroscedasticity (Eid & Hegazy, 1983). Non-stationary, as a rule, are accompanied by non-linear (Moldodikova et al., 1989). This necessitates the development and use of atypical approaches to modeling and forecasting the analysed processes (Gorbenkova et al., 2018). Vivid and well-known examples of such models are socio-economic indicators characterising the economic situation in a country (Refsgaard & Johnson, 2010). They describe non-linear behavior (Masduqi et al., 2010). Here the signs of unsteadiness are (Gronau et al., 2017):

–   structure of macroeconomic processes, which is unstable in time;
–   uncertainty of the future and critical values of the parameters of control processes;
–   complex formalisation of process dynamics.

Provided that not all the features will be taken into account, insufficient statistical sampling is possible when it is either impossible to conduct a correct analysis, assessment and valid forecasting of the dynamics of macroeconomic processes by classical methods, or the result will be of very poor quality (Rafindadi & Kondo, 2018; Kerimov et al., 2018a; Kerimov et al., 2018b).

2. Materials and Methods

The adequacy criteria of the model make it possible to separately assess the significance of the coefficients of the mathematical model in a statistical sense, to determine the integral error of the model relative to the initial time series, to establish the correlation between the values of the model error (they should not be correlated), and also to determine the degree of adequacy of the model to the physical process as a whole (Križanović et al., 2016). Consider the following statistical parameters: t – Student's statistic. The significance of each regression coefficient in a statistical sense is determined using t-test, which, as a rule, is calculated by all statistical software packages according to the formula:

$$t_a = \frac{\hat{a} - a_0}{SE_a} \tag{1}$$

where $\hat{a}$ – coefficient estimate obtained using the packet; a_o – null hypothesis regarding the value of this coefficient (usually $a_o=0$); SE_a – standard error of the estimate of the coefficient calculated in the packet.

Obviously, the lower the standard error, the better the estimate of the model coefficient (Müller & Munroe, 2005). To determine the significance of the coefficient, it is necessary to know the sample length N, the number of estimated parameters p and set the significance level α (usually set $\alpha=1\%$, $\alpha=5\%$, $\alpha=10\%$). A significance level of 5% means that when assessing the regression, we assume that erroneous decisions about the significance of the estimates are possible in 5% of cases. These parameters allow to select significances from the tables t_{crit}. When $t_{crit} < t_a < t_{crit}$ then the null hypothesis about the insignificance of the coefficient is accepted; otherwise, it is rejected and the coefficient is considered significant. Because the significance of statistics t_a inversely proportional to standard error SE_a, then the greater the significance t_a, the higher the value of a particular coefficient.

Determine coefficient R^2. The degree of informativeness of the time series often use its variance. Coefficient R^2 – this ratio of the variance of a part of the time series of the main variable is described by the resulting equation to the sample variance of this variable. It is calculated by the formula:

$$R^2 = \frac{var(\hat{y})}{var(y)} \tag{2}$$

For a valid model, the coefficient of determination should tend to unity, that is: $R^2 \rightarrow 1$. The sum of the squared errors of the model $\sum e^2(k)$, that is:

$$SSE = \sum_{k=1}^{N}[\hat{y}(k) - y(k)]^2 \tag{3}$$

Where N – sample length, measurement (4):

$$\hat{y}(k) = \hat{a}_0 + \hat{a}_1\hat{y}(k-1) + \hat{a}_2\hat{y}(k-2) + \hat{b}_1x(k) + b_2z(k); y(k) \tag{4}$$

Obviously, from the possible candidates it is necessary to choose the model for which $\sum e^2(k)$ takes the minimum value. Akaike Information Criterion (AIC). This criterion takes into account the sum of the squared errors, the number of measurements N and the number of estimated parameters p:

$$AIC = Nln\left[\sum_{k=1}^{N} - e^2(k)\right] + 2p \tag{5}$$

Obviously, for a better model, the criterion has lesser value, since it depends on the sum of the squared errors (SSE). However, in addition to SSE, this criterion takes into account the sample length and the number of estimated parameters, which makes it more informative. Durbin-Watson statistic. Durbin-Watson statistic are calculated using the formula:

$$DW = 2 - 2\rho \tag{6}$$

where ρ – correlation coefficient between random variable values $\varepsilon(k) \approx e(k)$, that is:

$$\rho = cov[e(k)] = E[e(k)e(k-1)] \tag{7}$$

This parameter allows to determine the correlation degree of model errors. In the complete absence of correlation between the errors $DW = 2$, this is the most acceptable value of this parameter. Fisher statistics F, which determines the validity degree of the model as a whole. For a valid model, the condition: $F > F_{crit}$, where F_{crit} determined by the table similar to t-statistics. Thus, a more valid model corresponds to a larger F value. The Tail coefficient is a very important indicator of model accuracy and compatibility:

$$U = \frac{\sqrt{\frac{1}{N}\sum_{i=1}^{N}(y_i - \hat{y}_i)^2}}{\sqrt{\frac{1}{N}\sum_{i=1}^{N}(y_i)^2} + \sqrt{\frac{1}{N}\sum_{i=1}^{N}(\hat{y}_i)^2}} \tag{8}$$

When building, its value is between 0 and 1. If $U = 1$, the model cannot be used for forecasting. Predicted, based on the obtained model, real series are not correlated. Otherwise, if $U = 0$, the predicted series coincide with the real series and the model is most preferable.

3. Results and Discussion

This coefficient can be broken down into the sum of the ratio U^M, the ratio of variations U^S, and the covariance ratio U^C:

$$U^M = \frac{(y_i - \hat{y}_i)^2}{\frac{1}{N}\sum_{i=1}^{N}(y_i - \hat{y}_i)^2} \tag{9}$$

U^M is used to check for systematic deviations for average real and predicted series. Or, in other words, the model constantly overestimates the forecast. The lower the value U^M the better. If $U^M=0$, then in the predicted values there is no bias and the model is qualitative. U^S – the ratio of variations and is defined as:

$$U^M = \frac{\left(\sigma_{actual} - \sigma_{fitted}\right)^2}{\frac{1}{N}\sum_{i=1}^{N}\left(y_i - \hat{y}_i\right)^2} \tag{10}$$

The ratio of variations is used to verify that the model has enough dynamic properties to absorb variations of real series. For example, a model can provide systematically smaller oscillations than oscillations of real series. Similarly, U^M, lower values of U^S are an indicator of less variations. U^C – the ratio of covariances and is defined as:

$$U^C = \frac{2(1-\rho)\left(\sigma_{actual} - \sigma_{fitted}\right)^2}{\frac{1}{N}\sum_{i=1}^{N}\left(y_i - \hat{y}_i\right)^2} \tag{11}$$

Covariance ratio U^C measures how correlated the predicted and real series are. Equivalence of U^C to zero indicates that the predicted and real series are perfectly correlated. It should be noted that:

$$U^C + U^C + U^C = 1 \tag{12}$$

To evaluate the model, it is necessary to determine how well the model reproduces real time series. It is always recommended to make a repeated (retrospective) forecast after modelling. The formal criteria for evaluating the forecast are: formal statistics; turning points (inflection points); sensitivity to changes in the source data; sensitivity to changes in coefficients. Root mean square error (RMSE):

$$RMSE = \sqrt{\frac{1}{S}\sum_{i=1}^{S}\left(y(k+s) - \hat{y}(k+s,k)\right)^2} \tag{13}$$

Average forecast error (AFE):

$$AFE = \frac{1}{S}\sum_{i=1}^{S} y(k+s) - \hat{y}(k+s,k) \tag{14}$$

Average error in percent (PAE):

$$PAE = \frac{1}{S}\sum_{i=1}^{S}\frac{y(k+s) - \hat{y}(k+s,k)}{y(k+s)} \times 100\% \tag{15}$$

Absolute average error in percent (AAE):

$$AAE = \frac{1}{S}\sum_{i=1}^{S}\frac{|y(k+s) - \hat{y}(k+s,k)|}{|y(k+s)|} \times 100\% \tag{16}$$

Maximum absolute error (MAE):

$$MAE = max\{|y(k+1) - \hat{y}(k+1,k)|, \ldots, |y(k+s) - \hat{y}(k+s,k)|\} \qquad (17)$$

Minimum absolute error (MIAE):

$$MIAE = min\{|y(k+1) - \hat{y}(k+1,k)|, \ldots, |y(k+s) - \hat{y}(k+s,k)|\} \qquad (18)$$

Estimating models by inflection points is an important indicator, as some models may have greater accuracy, but there may be cases where they may not work well in predicting changes in trends or cycles. Other models may be less accurate, but may exhibit a higher dynamic character. We can talk about a compromise between accuracy and dynamic properties. Unfortunately, there is no formula test for these properties. However, a visual check of the predicted and real series quickly determines if the model includes inflection points. Another important test of the quality of the model is the analysis of sensitivity to the initial (starting) data. If the model gives results that are generally roughly independent of the initial data, then this model is considered to be of high quality.

To create an adaptive forecasting system, it is necessary to choose a process, analyse its current state, existing models and approaches to its forecasting. An analysis of specialised literature can greatly help in finding an existing model to describe the behaviour of a selected process. For example, we can find mathematical models in the form of systems of equations, laws of distribution of input and output quantities (statistical models), or logical models in the form of sets of rules that characterise the interaction of inputs and outputs. Recently, probabilistic methods and models of various structures, as well as models in the form of fuzzy logic rules, have become more and more widespread and popular. To implement the further stages of creating predictive and control systems, a choice is made of the type and structure of the model (Kuznetsov et al., 2018; Lapidus et al., 2018a; Lapidus et al., 2018b).

For example, consider a model that is created on the basis of theoretical concepts and patterns regarding a specific process. It may require only clarification of its parameters, which can be obtained using statistical data. And in another case, a model that is completely based on statistical studies may require significantly larger amounts of information and time to build it. It is also necessary to inspect other specialised literature, but we need to know the features of the selected methods and the boundaries of their application. The software product obtained this way is the simplest in terms of architecture. That is why the use of this software product will be appropriate, convenient and profitable in organisations that do not have in-depth knowledge of computer programming. The architecture of the simulated software product has the following levels (Fig. 1).
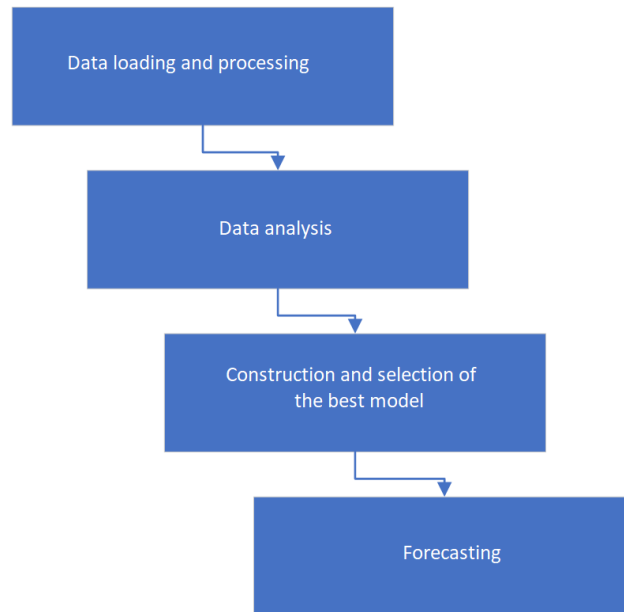
Fig. 1. Architecture levels of the simulated software product

Consider each of these levels: data is loaded at the first level; at the second level, it is possible to visually evaluate data, conduct statistical, correlation analysis, analysis for non-linearity and non-stationarity; at the third level, models are built; at the fourth level, forecasting is based on the created model. It is also possible to depict a functional diagram that expresses the content of the simulated software product (Fig. 2).

To analyse and build models and forecasts, four time series were chosen: USD/CHF (208 values), CPI (60 values), LTV (107 values) and RST (100 values). USD/CHF (US Dollar/Swiss Franc) is a currency pair consisting of the US dollar and Swiss franc. On traders' slang, this pair is also known as Swiss. This pair is in fifth place among the most traded currencies on the market and is the world's reserve currency. USD/CHF is considered a safe haven for traders due to the economic stability and the neutral political nature of Switzerland. As data we take the minimum weekly prices of the USD/CHF currency pair (208 values) from 2016 (Fig. 3).
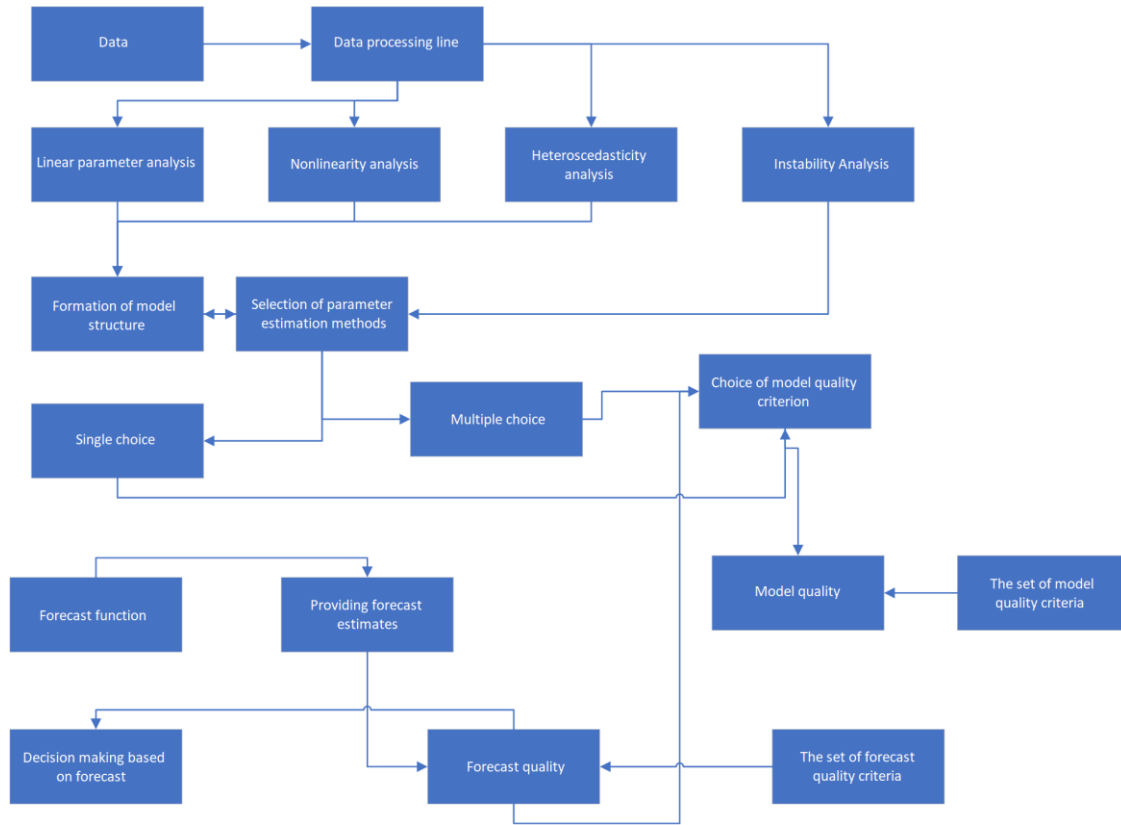
Fig. 2. Functional diagram of a simulated software product
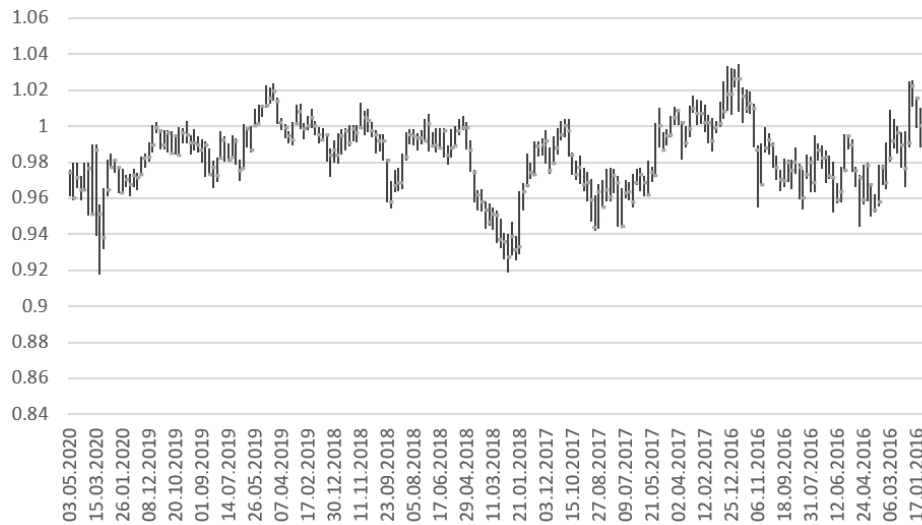
Fig. 3. USD/CHF series

Statistical characteristics of the USD CHF series: average 1.2107; dispersion 0.0005; asymmetry coefficient 0.2803; excess 2.4929; Jacques-Berah 4.9518. CPI – Consumer Price Index (CPI) characterises the changes over time of the general price level for goods and services that the population buys for non-productive consumption. It is an indicator of changes in the cost of a fixed set of consumer goods and services in the current period to its value in the base period.

CPI (Fig. 4) is the most important indicator that characterises inflationary processes in the country's economy and is used to solve many issues of state policy, analyse and forecast price processes in the economy, review the size of cash incomes and minimum social guarantees of the population, resolve legal disputes, recount indicators system of national accounts at constant prices.
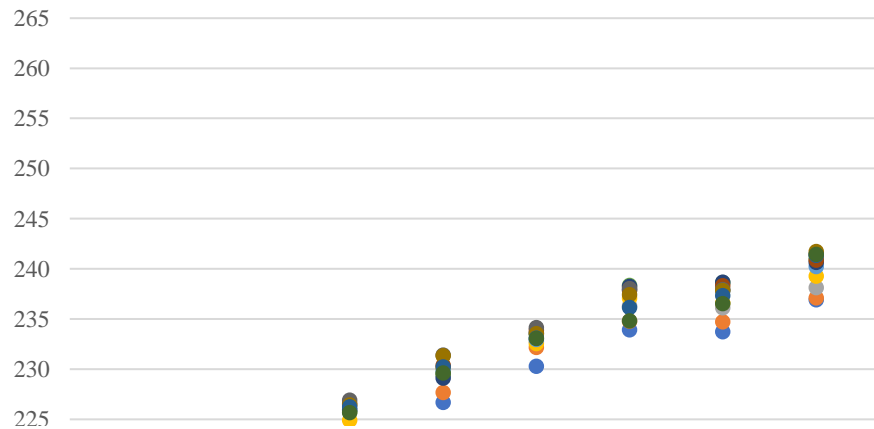
Fig. 4. CPI series (consumer price index)

Statistical characteristics of the CPI series: average 100.35; dispersion 1.5534; asymmetry coefficient 0.2599; excess 3.4014; Jacques-Berah 1.0785. Gross revenue is the amount of money a company receives as a result of doing business, and expenses are not taken into account. For example, a retailer receives revenue from the sale of goods, but the gross revenue does not include the cost of acquiring goods from suppliers, labor costs for employees, overhead associated with running a business, and the lost revenue from returning goods or theft. Gross revenue refers only to the amount of income received only from the sale of goods or services, or from other sources of income, such as royalties and investments, excluding related costs. It should be noted that gross revenue is not the main indicator for many companies, although in some situations it is of great importance (Fig. 5).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
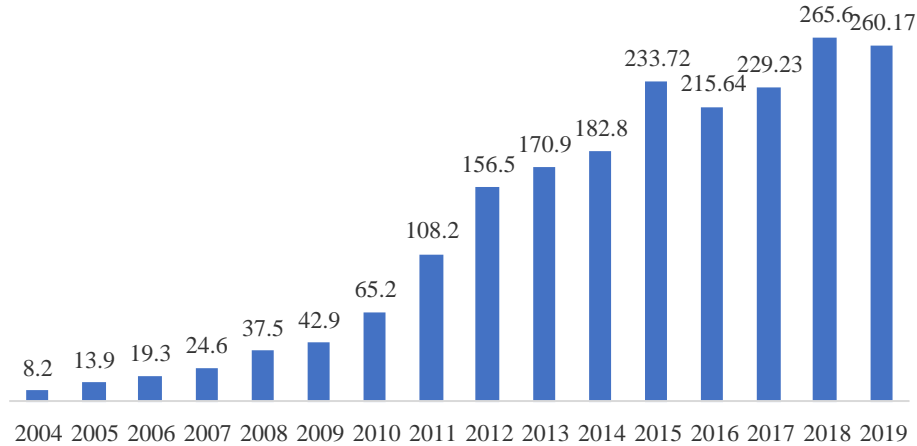
Fig. 5. GR series (Gross Revenue) Apple Inc, 2004-2019

Since this indicator does not reflect the costs associated with doing business, it does not always reflect how efficiently the company operates. In professional language, gross revenue is sometimes called the "Top Line", since this indicator is usually placed at the top of various financial statements. At the same time, expense items associated with the conduct of activities are placed below this indicator (Fig. 6). Statistical characteristics of Gross Revenue: average 14380.36; dispersion 527119888.4945; asymmetry coefficient 0.7334; excess 2.7167; Jacques-Berah 10.0439. RST – net profit.
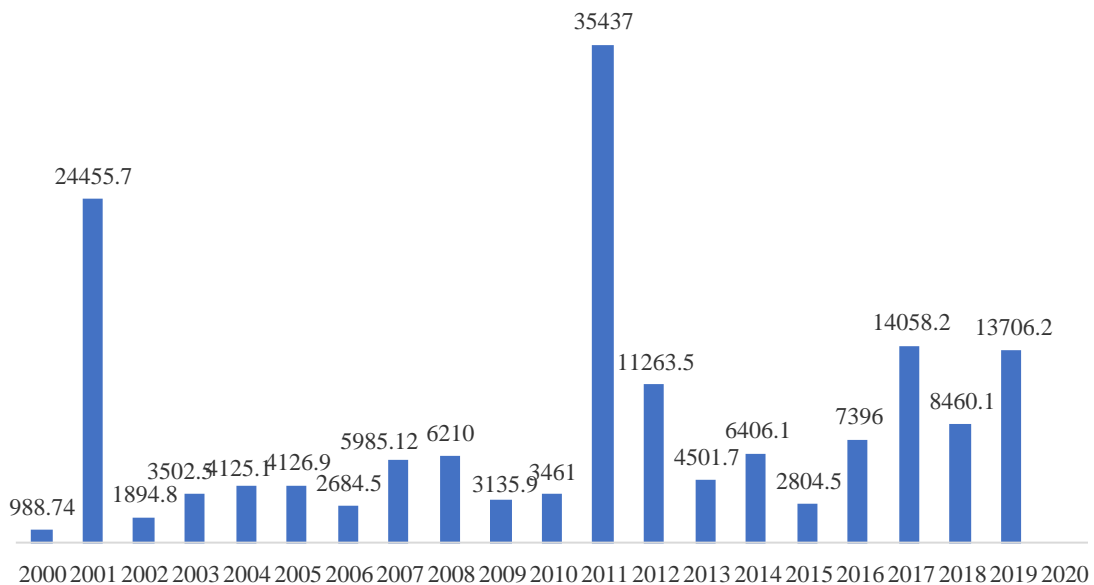
Fig. 6. RST series (average per employee, 2000-2020)

521

Statistical characteristics of the RST series: average 0.2634; dispersion 23.69521; asymmetry coefficient 0.5483; excess 4.3794; Jacques-Berah 12.9377. First, consider the possibility of describing the selected processes using the autoregressive model. Autoregressive models are the simplest in their structure, but quite often they have a high degree of validity to the process under study, acceptable for further use. We build an autoregressive model for the USD/CHF series: autoregression of the 14-th order:

$$y(k) = 0,0133 + 0,9655^*y(k-1) + 0,0099^*y(k-2) +$$
$$+0,0319^*y(k-3) - 0,1146^*y(k-4) + 0,0521^*y(k-5) +$$
$$+0,1001^*y(k-6) - 0,0682^*y(k-7) - 0,0918^*y(k-8) +$$
$$+0,0995^*y(k-9) + 0,1130^*y(k-10) - 0,1521^*y(k-11) +$$
$$+0,0017^*y(k-12) + 0,0472^*y(k-13) - 0,0057^*y(k-14) \tag{19}$$

Therefore, statistical characteristics of the model: $R^2 = 0,9516; \sum e^2 = 0,00459; DW = 1,9692$. The determination coefficient takes on values (0.9516), the sum of the squared errors is very small (0.00459), and the Durbin-Watson statistic (1.9692) is approaching the best value. The quality characteristics (for the training sample) for the forecast of the selected series RMSE = 0.003473; PAE = 4.2%. (Fig. 7):
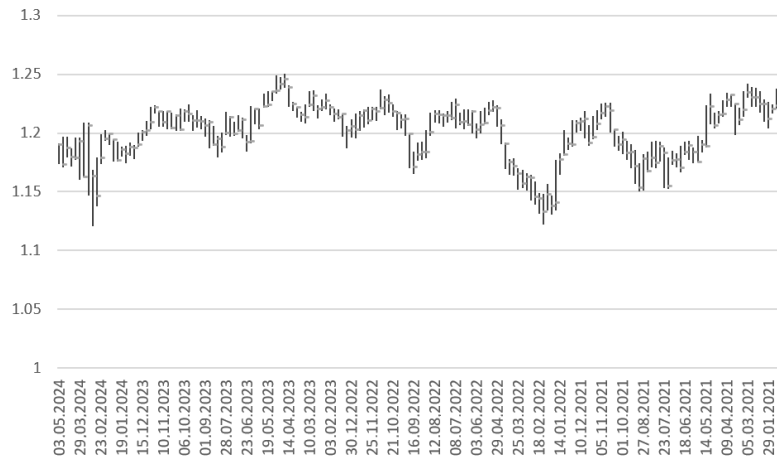
Fig. 7. Forecast for USD/CHF

That is, the root means square error (RMSE) and the average error in percent (PAE) indicate the general suitability of the forecasting model. Next, we will build another model for the USD/CHF series: 5-th order autoregression:

$$y(k) = 0,0140 + 0,9637 * y(k-1) - 0,0114 * y(k-2) + 0,0832 *$$
$$* y(k-3) - 0,1271 * y(k-4) + 0,0796 * y(k-5) \tag{20}$$

Therefore, statistical characteristics of the model: $R^2 = 0,9541; \sum e^2 = 0,00463; DW = 2,0024$. The coefficient of determination takes on values (0,9541), the sum of the squared errors is very small (0.00463), and the Durbin-Watson statistic (2.0024) is approaching the best value. The quality characteristics (for the selected row RMSE=0,003778; PAE=4,524% (Fig. 8).

Fig. 8. Forecast for USD/CHF

That is, the root means square error (RMSE) and the average error in percent (PAE) indicate the general suitability of the model for forecasting. Here is a general table of model quality estimates and forecast for a series of USD/CHF (Table. 1).

Table 1. Results of modelling and forecasting for a series of USD/CHF according to various quality criteria

Statistical series	Model type	Model validity			Forecast characteristic	
		R^2	$\sum e^2$	DW	RMSE	PAE %
USD/CHF	AR(14)	0.9516	0.00459	1.9692	0.003473	4.2
	AR(5)	0.9541	0.00463	2.0024	0.00378	4.524

As can be seen from the table, the AR showed the best in terms of forecast quality and model quality (14). We will build an autoregressive model for the CPI series: 15-th order autoregression:

$$y(k) = 43,266 + 0,6589^*y(k-1) - 0,4392^*y(k-2) + 0,4476^*y(k-3) -$$
$$-0,1289^*y(k-4) - 0,0756^*y(k-5) + 0,0068^*y(k-6) - 0,0273^*y(k-7) -$$
$$-0,0604^*y(k-8) - 0,0178^*y(k-9) + 0,1186^*y(k-10) - 0,0039^*y(k-11) +$$
$$+0,5238^*y(k-12) - 0,3695^*y(k-13) + 0,1725^*y(k-14) -$$
$$-0,2428^*y(k-15) \tag{21}$$

Therefore, statistical characteristics of the model: $R^2 = 0,544; \sum e^2 = 0,696; DW = 2,035$. The determination coefficient takes on values (0.544), the sum of the squared errors is very small (0.696), and the

Durbin-Watson statistic (2.035) is approaching the best value. The quality characteristics (for the training selection) for the forecast of the selected series RMSE = 1,0504; PAE = 3.28% (Fig. 9).
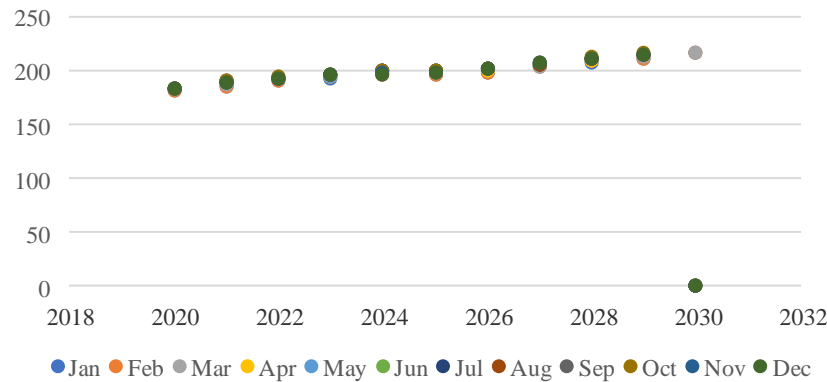
Fig. 9. Forecast for CPI

That is, the root means square error (RMSE), the average error in percent (PAE) indicates the general suitability of the model for forecasting. Next, it is necessary to build another autoregressive model for the CPI series: autoregression of 3-rd order with a moving average value of 5:

$$y(k) = 27{,}1206 + 1{,}1446^*y(k-1) - 0{,}7030^*y(k-2) + 0{,}2875^*y(k-3) -$$
$$-0{,}4281^*v(k-1) + 0{,}0572^*v(k-2) + 0{,}2875^*v(k-3) - 0{,}156^*v(k-4) -$$
$$-0{,}3263^*v(k-5) \tag{22}$$

Therefore, statistical characteristics of the model: $R^2 = 0{,}9496; \sum e^2 = 1{,}038; DW = 2{,}7359.$ The

determination coefficient takes on values (0.9496) better than the previous one, the sum of the squared errors (1.038) shows a certain deterioration according to preliminary results, and the Durbin-Watson statistic (2.7359) showed poor results and a significant deterioration with previous models. The quality characteristics (for the training selection) for the forecast of the selected series RMSE = 0.909; PAE = 2.81% (Fig. 10).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
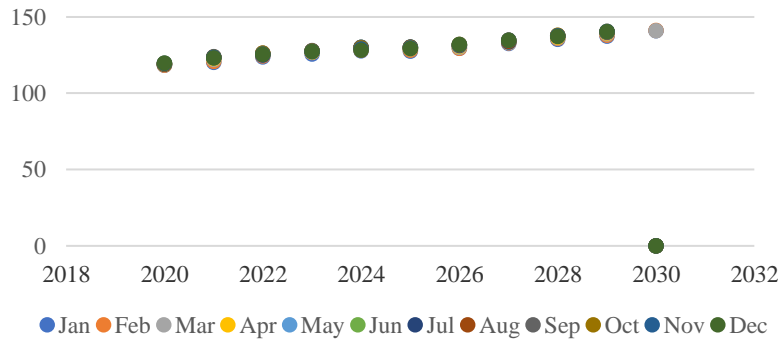

Fig. 10. Forecast for CPI

The root means square error (RMSE), the average error in percent (PAE) decreased compared to the previous result. Here is a general table of model quality estimates and forecast for a CPI series (Table. 2):

Table 2. Results of modelling and forecasting of the consumer price index by various quality criteria

Statistical series	Model type	Model validity			Forecast characteristic	
		R^2	$\sum e^2$	DW	RMSE	PAE%
CPI	AR(14)	0.544	0.696	2.035	1.0504	3.28
	MAA(3.5)	0.9496	1.038	2.7359	0.909	2.81

The constructed MAA model (3.5) had good results, but the Durbin-Watson statistic was 2.7359, which is a big deviation, but the forecast is of high-quality. We will build an autoregressive model for the RST series: 14-th order autoregression:

$$y(k) = 0,0974 + 1,1098y(k-1) + 0,1776^*y(k-2) +$$
$$+0,0297^*y(k-3) - 0,0054^*y(k-4) + 0,1289^*y(k-5) +$$
$$+0,0809^*y(k-6) - 0,0747^*y(k-7) - 0,1301^*y(k-8) +$$
$$+0,3111y(k-9) + 0,0717y(k-10) - 0,0392^*y(k-11) +$$
$$+0,1999^*y(k-12) + 0,3538^*y(k-13) - 0,367^*y(k-14) \tag{23}$$

Therefore, statistical characteristics of the model: $R^2 = 0,91; \sum e^2 = 1,567; DW = 1,946.$ The determination

coefficient takes on values (0.91), the sum of the squared errors (1.567), and the Durbin-Watson statistic (1.946). The quality characteristics (for the training selection) for the forecast of the selected series RMSE=2.22; PAE=3.84% (Fig. 11):
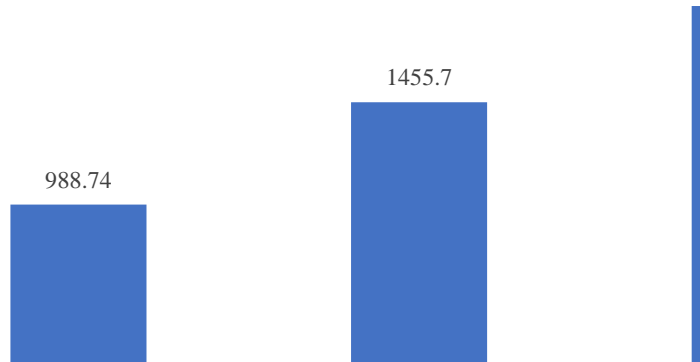
Fig. 11. Forecast for RST

Next, we will build another autoregressive model for the RST series: autoregression of the 5-th order:

$$y(k) = 0{,}0504 + 1{,}0972 * y(k-1) - 0{,}1664 * y(k-2) + 0{,}0086 *$$
$$* y(k-3) - 0{,}0031 * y(k-4) + 0{,}118 * y(k-5) \qquad (24)$$

Therefore, statistical characteristics of the model: $R^2 = 0{,}881; \sum e^2 = 1{,}7161; DW = 2{,}0003.$ The coefficient of determination takes on the value (0.881), a certain deterioration with the previous results, the sum of the squared errors takes on the value (1.7161), and the Durbin-Watson statistic (2,0003). The quality characteristics (for the training selection) for the forecast of the selected series RMSE=3.084; PAE=5.7% (Fig. 12):
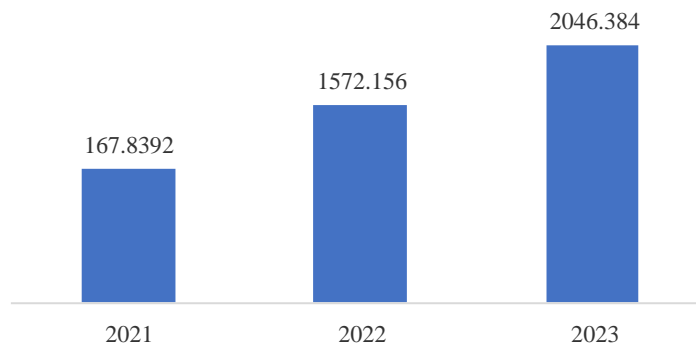
Fig. 12. Forecast for RST

Next, build another autoregressive model for the RST series: autoregression of the 14-th order with a moving order average of 6:

$$y(k) = -,1694 + 0,7666^*y(k-1) - 0,2212^*y(k-2) + 0,0918^*y(k-3) +$$
$$0,6318^*y(k-4) - 0,0669^*y(k-5) - 0,0281^*y(k-6) - 0,3432^*y(k-7) -$$
$$-0,0723^*y(k-8) + 0,1748^*y(k-9) - 0,0125^*y(k-10) + 0,1072^*y(k-11) -$$
$$-0,0728^*y(k-12) + 0,2445^*y(k-13) - 0,447^*y(k-14) + 0,3569^*v(k-1) +$$
$$+0,3941^*v(k-2) + 0,3301^*v(k-3) - 0,4632^*v(k-4) - 0,3127^*v(k-5) -$$
$$-0,3943^*v(k-6) \tag{25}$$

Therefore, statistical characteristics of the model: $R^2 = 0,9357; \sum e^2 = 2,0124; DW = 1,144.$ The determination coefficient takes on values (0.9357), the sum of squared errors (2.0124), and Durbin-Watson statistic (1.144) showed a significant deterioration in the results. The quality characteristics (for the training selection) for the forecast of the selected series: RMSE=4.306; PAE=6.18%. The root means square error (RMSE), the average error in percent (PAE) decreased compared to the previous result. Since the series is heteroscedastic, we construct a 5th-order autoregressive model with a quadratic trend (Table 3).

Table 3. Evaluation results of the AR (5) model with a quadratic trend for the RST series

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.540648	0.742731	0.727919	0.4686
C(2)	1.060074	0.107005	9.906769	0.0000
C(3)	-0.168990	0.156169	-1.082099	0.2822
C(4)	0.009839	0.158695	0.061999	0.9507
C(5)	0.005448	0.157561	0.034579	0.9725
0(6)	-0.025252	0.107743	-0.234377	0.8152
C(7)	-0.040421	0.034520	-1.170945	0.2448
0(8)	0.000466	0.000329	1.415894	0.1604
R-squared	0.886090	Mean dependent var		0.236716
Adjusted R-squared	0.876925	S.D. dependent var		5.019531
S.E. of regression	1.760954	Akaike info criterion		4.050040
Sum squared resid	29.78344	Schwarz criterion		4.265104
Log likelihood	-184.3769	Hannan-Quinn criterion		4.136942
F-statistic	96.68033	Durbin-Watson statistic		2.001821
Prob(F-statistic)	0.000000			

As a result, the following model was obtained:

$$y(k) = 0,541 + 1,06^*y(k-1) - 0,169^*y(k-2) + 0,0098^*y(k-3) +$$
$$+0,0054^*y(k-4) - 0,02525^*y(k-5) - 0,040^*k + 0,00046^*k^2 \tag{26}$$

The validity of the model is estimated by the following parameters: $R^2 = 0,886; \sum e^2 = 29,7834; DW = 2,001.$ The determination coefficient takes on values (0.886), the sum of the squared errors (29.7834) showed a big value, and the Durbin-Watson statistic (2.001) are almost ideal. The

quality characteristics (for the training selection) for the forecast of the selected series RMSE=3.948; PAE=5.9%. Here is a general table of model quality estimates and forecast for a number of RST (Table 4).

Table 4. Results of modelling and forecasting of RST series

Statistical series	Model type	Model validity			Forecast characteristic	
		R^2	$\sum e^2$	DW	RMSE	PAE%
RST	AR(14)	0.91	1.567	1.946	2.22	3.84
	AR(5)	0.881	1.7161	2.0003	3.084	5.7
	MAA(14.6)	0.9357	2.0124	1.144	4.306	6.18
	AR(5)+k2	0.886	29.7834	2.001	3.948	5.9

The best results in forecasting, i.e., with the slightest errors, were shown by the AR (14) model. We build an autoregressive model for the GR series: autoregression of the 13-th order:

$$y(k) = -23{,}2267 + 0{,}8006^*y(k-1) - 0{,}0204^*y(k-2) + 0{,}1980^*y(k-3) - \\ -0{,}0778^*y(k-4) - 0{,}1195^*y(k-5) - 0{,}0915^*y(k-6) + 0{,}049^*y(k-7) + \\ +0{,}1996^*y(k-8) - 0{,}019^*y(k-9) + 0{,}0661^*y(k-10) - 0{,}0583^*y(k-11) + \\ +0{,}6971^*y(k-12) - 0{,}5836^*y(k-13)$$

(27)

Therefore, statistical characteristics of the model: $R^2 = 0{,}97; \sum e^2 = 1180{,}84; DW = 2{,}09.$ The coefficient of determination takes the value (0.97), the sum of the squared errors (1180.84), and the Durbin-Watson statistic (2.09). The quality characteristics (for the training selection) for forecasting the selected series RMSE=1760.38; PAE=1.88%. Next, we build a different autoregressive model for the GR series: autoregression of the 9-th order:

$$y(k) = -58{,}2995 + 0{,}6005^*y(k-1) + 0{,}1344^*y(k-2) + 0{,}2679^*y(k-3) + \\ +0{,}0205^*y(k-4) - 0{,}2479^*y(k-5) - 0{,}3625^*y(k-6) + 0{,}1359^*y(k-7) + \\ +0{,}3401^*y(k-8) - 0{,}1689^*y(k-9)$$

(28)

Therefore, statistical characteristics of the model: $R^2 = 0{,}954; \sum e^2 = 1515{,}07; DW = 2{,}0013.$ The determination coefficient takes the value (0.954), a certain deterioration with previous results, the sum of the squared errors takes the value (1515.07), and the Durbin-Watson statistic (2.0013). The quality characteristics (for the training selection) for the forecast of the selected series RMSE=2947.597; PAE=3.152%. Next, we build another autoregressive model for the GR series: autoregression of the 13-th order with an average order value of 2:

$$y(k) = 101{,}5948 + 1{,}1018^*y(k-1) + 0{,}0192^*y(k-2) + 0{,}0438^*y(k-3) - \\ -0{,}1646^*y(k-4) - 0{,}1465^*y(k-5) - 0{,}0244^*y(k-6) + 0{,}1603^*y(k-7) + \\ +0{,}2244^*y(k-8) - 0{,}1407^*y(k-9) - 0{,}0131^*y(k-10) - 0{,}0728^*y(k-11) + \\ +0{,}7389^*y(k-12) - 0{,}7314^*y(k-12) - 0{,}3671^*v(k-1) - 0{,}3632^*v(k-2)$$

(29)

Therefore, statistical characteristics of the model: $R^2 = 0{,}987; \sum e^2 = 1296{,}48; DW = 2{,}393.$ The determination coefficient takes on values (0.987), the sum of squared errors (1296.48), and Durbin-Watson statistic showed a significant improvement in the results. The quality characteristics for the forecast of the selected series RMSE=3315.991; PAE=8.4%. The root means square error (RMSE), the average error in percent (PAE) remained with a positive result. Here is a general table of model quality assessments for forecasting for GR series (Table 5),

Table 5. Results of modelling and forecasting of GR series

Statistical series	Model type	Model validity			Forecast characteristic	
		R^2	$\sum e^2$	DW	RMSE	PAE%
GR	AR(13)	0.97	1180.84	2.09	1760.38	1.88
	AR(9)	0.954	1515.07	2.0013	2947.59	3.152
	MAA(13.2)	0.987	1296.48	2.393	3315.99	8.4

The best results in the forecasting, that is, the AR (13) model with small errors. Based on the results of previous studies, we build models of selected processes using the commercial product GMDH Shell, which uses the group argument method to build models. We analyse and predict the range of USD_CHF. Obtained model:

$$Y1[t] = -0.44331 + time^*(-0.000169013) + "x1[t-12], cubert"^* 1.56472 \qquad (30)$$

The coefficient of determination takes on the value of 0.628. The forecast characteristic of this series assumes the following values RMSE=0.498; PAE=1.278%. We analyse and forecast the consumer price index. Obtained model:

$$Y1[t] = 316.384 + "x1[t-5], cubert"^*(-37.8545) + "x1[t-3], cubert"^*(-8.68243) \qquad (31)$$

The coefficient of determination takes on the value of 0.45712. The forecast characteristic of this series assumes the following values RMSE=0.7747; PAE=0.61524%. As we can see, the forecast indicators give a high average absolute error in percent (PAE) which amounted to only 0.615%. It can be concluded that the model is suitable for use. Here is a model that is built for the RST series:

$$Y1[t] = 0.998017 + "x1[t-1], cubert"^*3.22661 + "x1[t-3], cubert"^*1.09025 +$$
$$+"x1[t-8], cubert"^*(-1.20318) + "x1[t-11], cubert"^*(-0.428972) + "x1[t-12],$$
$$cubert"^*0.412343 + "x1[t-4], cubert"^*0.506062 \qquad (32)$$

The determination coefficient of this model is 0.916219. The forecast characteristic of the RST series is as follows: RMSE=2.66394; PAE=5.27816%. Unfortunately, the forecast indicators are not sufficient, the PAE is 5.27816%. Consider the GR series:

$$Y1[t] = -4293.15 + "x1[t-1]^* + x1[x-12]^*3.99777e - 05 + x1[t-7]^{*"}x1[t-8],$$
$$cubert"^*0.0162273 + x1[t-3]^*x1[t-10]^*1.29137e - 05 +$$
$$x1[t-2]^{*"}x1[t-3], cubert"^*(-0.00356083) \qquad (33)$$

The determination coefficient of this model is 0.975549. The forecast characteristics of the GR series are as follows: RMSE=816.485; PAE=1.5856%. Here is a summary table for the estimates of the selected series (Table 6).

Table 6. Summary estimation table of selected series

Statistical series	Model type	Model validity			Forecast characteristic	
		R^2	$\sum e^2$	DW	RMSE	PAE%
USDCHF	AR(14)	0.9516	0.00459	1.9692	0.003473	4.2
	AR(5)	0.9541	0.00463	2.0024	0.00378	4.524
	GMDH	0.628			0.498	1.278
CPI	AR(15)	0.544	0.696	2.035	1.0504	3.28
	MAA(3.5)	0.9496	1.038	2.7359	0.909	2.81
	GMDH	0.45712			0.7747	0.61524
RST	AR(14)	0.91	1.567	1.946	2.22	3.84
	AR(5)	0.881	1.716	2.0003	3.084	5.7
	MAA(14.6)	0.9357	2.012	1.144	4.306	6018
	AR(5)+k2	0.886	29.783	2.001	3.948	5.9
	GMDH	0.91621			2.6639	5.2781
GR	AR(13)	0.97	1180.84	2.09	1760.38	1.88
	AR(9)	0.954	1515.07	20013	2947.59	3.152
	MAA(13.2)	0.987	1296.48	2.393	3315.99	8.4
	GMDH	0.976			816.485	1.5856

Conclusions

In order to maximise the reliability and accuracy of the forecast values, modelling was carried out on the basis of several models, after which a corresponding comparative analysis was performed. Prediction of time series was carried out on the basis of autoregressive models, and autoregressive models with moving average, and the method of group accounting of arguments. As a result of modelling based on these methods, it can be concluded that there are no universal methods for constructing and predicting time series. Each row is unique in its own way, and each one requires its own balanced approach. It can also be concluded that during modelling it is impossible to rely only on one parameter of model validity, each of these parameters is important for the calculations and forecasting.

The quality of the constructed model largely depends on the correct application of methods for estimating model parameters. As in linear and non-linear processes, parameters can be estimated using the least squares method, the maximum likelihood method, the Monte Carlo method for Markov chains. Nonlinear methods require setting initial conditions and controlling the convergence of the estimation process. The Monte Carlo method for Markov chains is characterised by flexibility of application, but it may take a long time to implement.

References

Bashynska, I.; Kovalova, O.; Malovichko, O.; Shirobokova, O. 2020. Risk management of innovative socially significant projects (on the example of urban passenger transport), *International Journal of Advanced Research in Engineering and Technology,* 11(4): 294-305.

Bashynska, I.; Sokhatska, O.; Stepanova, T.; Malanchuk, M.; Rybianets, S.; Sobol, O. 2019. Modelling the risks of international trade contracts, *International Journal of Innovative Technology and Exploring Engineering,* 8(11): 2815-2820.

Bliznets, I.A.; Kartskhiya, A.A.; Smirnov, M.G. 2018. Technology transfer in digital era: legal environment, *Tarih Kültür ve Sanat Araştırmaları Dergisi – Journal of History Culture and Art Research,* 7(1): 354-363.

Bryden, J.M.; Johnson, T.; Thomson, K.J.; Ferenczi, T. 2011. Modelling multifunctionality, territorial development, and policy scenarios in rural Europe: An alternative perspective on CAP reform debates, *EuroChoices*, 10(1): 9-16. https://doi.org/10.1111/j.1746-692X.2011.00145.x

Do, M.H.; Park, S.C. 2018. New rural development and hierarchical governance in Vietnam: Impacts of government support on rural households' income using a hierarchical linear modelling, *Agris On-Line Papers in Economics and Informatics*, 10(4): 3-15. https://doi.org/10.7160/aol.2018.100401

Eid, S.M.A.; Hegazy, O.M. 1983. Investigation into communication needs for rural development through modelling techniques, *Resource Management and Optimization*, 2(3): 269-292.

Ermilova, M. 2018. The use of European experience in mortgage lending in Russian conditions, *International Relations 2018: Current Issues of World Economy and Politics,* 1: 167-175. https://www.revistaespacios.com/a19v40n13/a19v40n13p27.pdf

Fedotov, A.M.; Murzakhmetov, A.N.; Dyusembaev, A.E. 2018. Expansion of ideas and processes in social and biological communities, *Eurasian Journal of Mathematical and Computer Applications,* 6(4): 17-28.

Gorbenkova, E.; Shcherbina, E.; Belal, A. 2018. Rural areas: Critical drivers for sustainable development, *IFAC-PapersOnLine*, 51(30): 786-790. https://doi.org/10.1016/j.ifacol.2018.11.195

Gronau, S.; Winter, E.; Grote, U. 2017. Modelling nature-based tourism impacts on rural development and conservation in Sikunga Conservancy, Namibia, *Development Southern Africa*, 34(3): 276-294. http://hdl.handle.net/10.1080/0376835X.2016.1269638

Hatherley, S.; Cole, W.; Counsell, J.; Geens, A.; Littlewood, J.; Sinnett, N. 2013. An exploration of design alternatives using dynamic thermal modelling software of an exemplar, affordable, low carbon residential development constructed by a registered social landlord in a rural area of Wales, *Smart Innovation, Systems and Technologies*, 22: 601-611. https://doi.org/10.1007/978-3-642-36645-1_56

Johnson, T.G.; Roberts, D.; Wojan, T.R. 2010. Model-based evaluation of rural development policies, *EuroChoices*, 9(1): 30-36. 10.1111/j.1746-692X.2010.00152.x

Kerimov, V.; Rachinsky, M.; Mustaev, R.; Serikova, U. 2018a. Geothermal conditions of hydrocarbon formation in the South Caspian basin, *Iranian Journal of Earth Sciences,* 10(1): 78-89.

Kerimov, V.Yu.; Mustaev, R.N.; Osipov, A.V. 2018b. Peculiarities of hydrocarbon generation at great depths in the crust, *Doklady Earth Sciences,* 483(1): 1413-1417.

Kline, J.D.; Moses, A.; Lettman, G.J.; Azuma, D.L. 2007. Modeling forest and range land development in rural locations, with examples from eastern Oregon, *Landscape and Urban Planning*, 80(3): 320-332.

Križanović, Č.V.; Žagar, D.; Rimac-Drlje, S. 2016. Broadband ecosystem elements in techno-economic modelling and analysing of broadband access solutions for rural areas, *Tehnicki Vjesnik*, 23(1): 279-290. https://doi.org/10.17559/TV-20150508131935

Kuznetsov, N.B.; Kerimov, V.Yu.; Osipov, A.V.; Bondarev, A.V.; Monakova, A.S. 2018. Geodynamics of the Ural foredeep and geomechanical modeling of the origin of hydrocarbon accumulations, *Geotectonics,* 52(3): 297-311.

Lapidus, A.L.; Kerimov, V.Yu.; Mustaev, R.N.; Movsumzade, E.M.; Salikhova, I.M.; Zhagfarov, F.G. 2018a. Natural bitumens: physicochemical properties and production technologies, *Solid Fuel Chemistry,* 52(6): 344-355.

Lapidus, A.L.; Kerimov, V.Yu.; Tret'yakov, V.F.; Talyshinskii, R.M.; Ilolov, A.M.; Movsumzade, E.M. 2018b. Extraction of asphaltite with toluene, *Solid Fuel Chemistry,* 52(4): 256-259.

Leinbach, T.R.; Cromley, R.G. 1989. Modeling integrated development investments in rural areas: An Indonesian illustration, *International Regional Science Review*, 12(2): 229-243. https://doi.org/10.1177/016001768901200207

Masduqi, A.; Endah, N.; Soedjono, E.S.; Hadi, W. 2010. Structural equation modeling for assessing of the sustainability of rural water supply systems, *Water Science and Technology: Water Supply*, 10(5): 815-823. https://doi.org/10.2166/ws.2010.339

Moldodikova, N.I.; Petrov, P.V.; Serbenyuk, S.N. 1989. Automated mathematical cartographic modelling of the interconnected development of urban and rural settlements in the Central Economic Region, *Vestnik Moskovskogo Universiteta, Seriya Geografiya*, 3: 71-78.

Müller, D.; Munroe, D.K. 2005. Tradeoffs between rural development policies and forest protection: Spatially explicit modeling in the Central Highlands of Vietnam, *Land Economics*, 81(3): 412-425.

Newburn, D.A.; Berck, P. 2006. Modeling suburban and rural-residential development beyond the urban fringe, *Land Economics*, 82(4): 481-499. https://doi.org/10.3368/le.82.4.481

Pyagay, A.A.; Tulegenova, Z.U.; Urazgaliyeva, M.A.; Zhunusova, Z.G.; Shintayeva, S.S.; Aytzhanova, A. 2014. Complex analysis of risks and statistic dependents in domestic bank system, *Life Science Journal,* 11(6S): 133-139.

Rafindadi, A.A.; Kondo, K.A. 2018. Public finance and rural development in Nigeria: Empirical evidence from the structural equation modelling, *Asian Economic and Financial Review*, 8(11): 1313-1339. https://doi.org/10.18488/journal.aefr.2018.811.1313.1339

Refsgaard, K.; Johnson, T.G. 2010. Modelling policies for multifunctional agriculture and rural development-a norwegian case study, *Environmental Policy and Governance,* 20(4): 239-257. https://doi.org/10.1002/eet.549

Rushton, G. 1992. Lessons from the debate on location analysis in rural economic development, *International Regional Science Review*, 15(3): 317-324. https://doi.org/10.1177/016001769301500311

Salimyanova, I.G.; Novikov, A.A.; Novikova, E.V.; Lushchik, I.V.; Savderova, A.F.; Berezina, N.V.; Rudenko, L.G.; Allalyev, R.M. 2019. Economy digitalization: Information impact on market entities, *Journal of Environmental Treatment Techniques,* 7(4): 654-658.

Saqalli, M.; Gérard, B.; Bielders, C.L.; Defourny, P. 2011. Targeting rural development interventions: Empirical agent-based modeling in Nigerien villages, *Agricultural Systems*, 104(4): 354-364. https://doi.org/10.1016/j.agsy.2010.12.007

Yessilov, A. 2015. Social work with immigrants in Kazakhstan as means of prevention of the social conflicts in society, *Mediterranean Journal of Social Sciences,* 6(5): 259-264.

Oleg V. ZAKHARCHENKO
ORCID ID: orcid.org/0000-0001-8198-6569

EU WASTE REGULATION IN THE CONTEXT OF THE CIRCULAR ECONOMY: PECULIARITIES OF INTERACTION

Andrius Stankevičius [1], Andrejus Novikovas [2], Audrius Bakaveckas [3], Oleh Petryshyn [4]

[1,2,3] Mykolas Romeris University, Ateities Str. 20, Vilnius, Lithuania
[4]Yaroslav Mudryi National Law University, Pushkinskaya Str. 77, Kharkiv,
Ukraine

Emails:[1] stankevicius@mruni.eu ; [2]andrejus@mruni.eu ; [3]audrius@mruni.eu ;[4] poe244@gmail.com

Abstract. The European Union (EU) is implementing the concept of the circular economy (hereafter – CE) system, the main idea of which is to maintain the added value in products for as long as possible both to improve the quality of the environment and eliminate waste. These provisions presuppose the improvement of EU waste management systems and legal regulation. The European Commission proposed a legislative package for amending the main Directives related to waste management. The European Parliament and the Council adopted this document in 2018. The legislative package amends six Directives, which are the main components of the legal framework for waste management in the EU. These are systematic changes in EU waste law regulation and include: the modification of the waste management system; the alignment of definitions; and the formulation of new legal definitions (for example municipal waste, backfilling) or establishment of qualitative and quantitative indicators which cover the meaning of waste hierarchy. The aim of this article is to divulge the main legal changes, and to evaluate their content in the context of the concept of the CE.

1. Introduction

Over the last 5 years there has been an unprecedented speed of development in, on the one hand, such phenomena as Industry 4.0 and, on the other, the legal regulation of environmental protection. Today's economy, in the context of Industry 4.0, is based on digitization, technological development, big data, nanotechnology, and smart intelligence, and determines the development of industry activities whilst increasing consumption. The phenomena mentioned presuppose an increase in the use of natural resources and waste generation. The amount of waste generated and the disproportionate use of natural resources are factors that contribute to environmental degradation. The Treaty on the Functioning of the European Union (hereinafter – TFEU; Articles 11, 114, 191–193) divulges certain objects of environmental protection: the quality of the environment, human health, natural resources, and climate change. We can also include city and country planning, water resources, and land use as, according to L. Kramer, "environment is not limited to natural elements, but also covers man-made environment" (2012, pp. 9–11). Waste management, as a systematic phenomenon, impacts environmental and social problems in a comprehensive manner.

Firstly, waste management (as a system) is a source of air, land, and water pollution. As an example, waste disposal activities include: depositing into or onto land, taking up land space and impacting the quality of air and soil; releasing waste into seas/oceans, impacting water quality; incineration on land or at sea, or variant physical–chemical or biological treatments, which may result in the emission of air pollutants. This means that waste management significantly affects the environment, and has serious impacts on the degradation of the whole ecosystem (Eurostat, 2019; Tvaronavičienė, 2016).

Secondly, the management of waste is related to climate change. According to the European Environment Agency's statistical data, air pollution and climate change are intertwined. Several air pollutants are also climate forcers, which have potential impacts on climate change and global warming in the short term (Limba, Novikovas, Stankevičius, Andrulevičius, & Tvaronavičienė, 2020). For example, waste contributes a significant amount of CH_4 emissions (European Environmental Agency, 2018).

Thirdly, waste management affects the utilization of natural resources and ensures the recovery of resources. According to Eurostat (2019), waste potentially represents an enormous loss of resources in the form of both materials and energy. Recycled materials are "secondary raw materials", which are injected back into the economy as new raw materials. Waste management practices have a direct impact on the quantity and quality of these materials (European Commission, 2015a).

Fourthly, the waste management sector impacts on market costs and the economic system. Pollution (for example of the air) determines both market costs and non-market costs. Market costs include reduced labour productivity, additional health expenditure, and losses in both crop and forest yields. Non-market costs are those associated with increased mortality and morbidity (causing illness, for example, and resulting in pain and suffering), the degradation of air and water quality and consequently the health of ecosystems, as well as climate change (European Environmental Agency, 2018). On the other hand, resource efficiency improvements could represent an overall savings potential of €630 billion per year for European industry and material cost saving opportunities for EU industry, boosting EU GDP by up to 3.9% (European Commission, 2014).

Fifth, the waste management sector exists as a critical piece of infrastructure and forms part of the security phenomena. The waste management system interacts with economic, ecological, and national security issues (Novikovas & Stankevičius 2018).

The implementation of the circular economy model at the EU level started in 2014–2015, emphasizing ideas of environmental protection and sustainable development. The concept of sustainable development was first introduced in 1987 in the report by United Nations World Commission on Environment and Development (1987) called *Our Common Future* as a "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". According this report, sustainable development contains two key concepts: the concept of *needs*, in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs. Research papers divulge the concept of sustainability into the triple bottom line (3BL), which encompasses three pillars of sustainability: economic, social, and environmental (Elkington, 1997). Environmental responsibility in the form of environmentally friendly and more efficient processes enables potential differentiation for businesses. Product and process innovations allow for additional benefits, including cost savings. From this point of view, environmental responsibility should be seen as a competitive advantage and not only as an inconvenient cost (Moumen, El Idrissi, Tvaronavičienė, & Lahrach, 2019; Pechancová, Hrbáčková, Dvorský, Chromjaková, & Stojanovicet, 2019).

The main idea of the Circular Economy Action Plan, (European Commission, 2015a) is to boost and create new jobs, for growth and investment, and to develop a carbon-neutral, resource-efficient, and competitive economy. It provides for a new approach to municipal waste management, a transition from the linear model "take, produce, throw away", to the circular economy model "waste prevention, eco-design, re-use, recycling and creating a circle market cycle" (Limba et al., 2020). The environmental protection concept, according to the CE phenomena, includes conventional consumer habits which "can also hinder new products and services development". Such barriers tend to persist in a context where prices do not reflect the real costs of resource use to society, and where policy fails to provide strong and consistent signals for the transition to a CE (European Commission, 2014). According to research papers, CE is understood as a system where the value is created by minimizing waste and the use of energy and natural resources (Tura et al., 2019). This is achieved by utilizing models for slowing, closing and narrowing loops of material and energy flows regeneratively, and following the principles of reduce, reuse, and recycle (Geissdoerfer, Savaget, Bocken, & Hultinket, 2017; Langen & Sornn-Friese, 2019; Sauvé, Bernard, & Sloan, 2016).

2. Methodology

The aim of this article is to divulge the main legal changes in EU waste regulation and to evaluate the content of these changes in the context of the CE concept. The aim of the article will be realized through the following objectives:

- To reveal the theoretical framework of CE in the context of legal regulation;
- To assess systemic legal developments on the basis of the Proposal Package on waste management in the EU, according to the CE concept;
- To reveal basic legal categories of change on waste management
- To disclose the main characteristic of these legal changes.

The research is based on such methods as document analysis, statistical data analysis, historical, linguistic, logical, and systematic analysis. The data for this paper were gathered according to the key words (*circular economy*, *waste management*, *waste hierarchy*, *municipal waste*, and *waste*), using the methods of document analysis and statistical data. The authors relied on databases, such as those of Web of Science or Scopus, Eurostat, European Environmental Agency, the Court of Justice of the European Union (hereinafter – CJEU), and the Publications Office of the EU, which provide quality data and information for conducting research of this nature.

The selected data, such as scientific literature, legal acts, and case-studies, were processed using content analysis. Using this method, the authors revealed legal categories related to the object of the topic. The linguistic (Latin lingua-language) method was used to reveal the meanings of the definitions by analysing the texts of scientific literature, the caselaw of CJEU, and legal documents. Using the historical method, the authors discussed the meaning of concepts such as waste, circular economy, and waste hierarchy throughout historical developments. A logical–systematic and linguistic analysis of the provisions of the legal acts related to the object of study, assessing them in the context of all other provisions of the legal regulation relevant to the dispute and taking into account the objectives pursued by the legal regulation, allowed for the reasonable formulation of conclusions.

3. The analysis of the concept and package of documents of circular economy

As mentioned above, the EU established a political commitment which enabled the transition from a linear model to a circular economy plan, outlining a new approach to waste management. It should be noted that this transition must be systematically analysed in the context of environment protection.

The European Parliament and the Council endorsed the 7th Environment Action Programme, in accordance with Articles 191–193 of the TFEU, which details European environmental policy (Decision No. 1386/2013). According to this document, waste management and the circular economy are identified as inter-related phenomena. For example, "prosperity and healthy environment stem from an innovative, circular economy where nothing is wasted and where natural resources are managed sustainably", or "barriers facing recycling activities in the Union internal market should be removed and existing prevention, re-use, recycling, recovery and landfill diversion targets reviewed so as to move towards a lifecycle-driven 'circular' economy, with a cascading use of resources and residual waste that is close to zero" (Decision No. 1386/2013).

The European Commission endorsed the Communications *Towards a Circular Economy: A Zero Waste Programme for Europe* (European Commission, 2014) and *Closing the Loop – An EU Action Plan for the Circular Economy* (European Commission, 2015a). As mentioned, the EU legal regulation does not establish an explicit definition of CE, but it reveals itself via the use of the systematic analysis method.

According to these documents, the long-term targets of the CE are: to reduce landfill; and to increase preparation for the reuse and recycling of key waste streams such as municipal waste and packaging waste. These provisions disclose the waste management system as a basic element of the CE, and presuppose the evaluation of the practical realization of waste hierarchy. The concept of the CE envisages the establishment of imperative provisions in legal acts, such as qualitative and quantitative criteria (for example high-quality recycling or boosting the reuse and recycling of municipal waste to a minimum of 70% by 2030) or the simplification and harmonization of definitions. Other elements of the CE involve: designing and innovating; consumption; and functioning markets for secondary materials. Table 1 (below) reveals the content of the elements of the circular economy.

Table 1. Elements of circular economy

Production	Designing
	• Reducing the quantity of materials required to deliver a particular service (lightweighting);
	• Lengthening products' useful life (durability);
	• Creating markets for secondary raw materials (recyclates) based on standards, public procurement, etc.
	Production processes
	• Use of best available techniques for waste management;
	• Implementation of the EU environmental management and audit system;
	• Promoting innovative industrial processes.
Consumption	• Green claims reliability, accuracy, and clarity for preventing and reducing the generation of household waste;
	• Implementation of EU Ecolabel system;
	• Ensuring methodology of Product Environmental Footprint;
	• Prevention of planned obsolescence practices.
Improving the EU legal framework for waste management	• Put into practice the EU waste hierarchy: prevention, preparation for reuse, recycling, energy recovery, disposal;
	• Alignment of definitions;
	• Increase of the target for preparing for reuse and recycling for municipal waste to 65% by 2030;
	• Gradual limitation of the landfill of municipal waste to 10% by 2030;
	• Greater harmonization and simplification of the legal framework on by-products and end-of-waste status.
Boosting the market for secondary raw materials	• Develop quality standards for secondary raw materials;
	• EU regulation on fertilisers;
	• Develop a Raw Materials Information System.

Source: compiled by authors based on European Commission (2014; 2015a)

The European Commission endorsed Proposal for amending Directive 2008/98/EC on waste contains the proposed legislative package for amending the main Directives for waste management, not only Directive 2008/98/EC (European Commission, 2015b). The main objectives of this document (European Commission, 2015b) involve turning waste into a resource and closing the loop in a circular economy. The proposals, which form part of the CE Package, are aimed at addressing the legal obligation to review waste management targets in six different Waste Directives: Directive 2008/98/EC on waste; The Landfilling Directive (1999/31/EC); The Packaging Waste Directive (94/62/EC); The Directives on end-of-life vehicles (2000/53/EC); The Directive (2006/66/EC) on batteries and accumulators (and waste batteries and accumulators); and the Directive on waste electrical and electronic equipment (2012/19/EU). The proposed legislative package also envisages the improvement of targets of waste management, the alignment of definitions, the simplification and streamlining of reporting obligations, the establishment of qualitative and quantitative standards of waste management systems, and the greater harmonization and simplification of the legal framework on by-products and end-of-waste status.

In summary, the legal framework of CE phenomena in the field of waste management covers: TFEU Articles 191–193; the 7th Environment Action Programme; European environment policy (Decision No. 1386/2013); and European Commission communications (2014; 2015a; 2015b), which form part of a Circular Economy Package which includes the six Waste Directives mentioned above.

It is noteworthy that EU environmental law has been in development since the 1970s. Several hundred directives, regulations, and decisions are in force today in this field. Moreover, the effectiveness of EU environmental policy is largely determined not only by its implementation at the national, regional, and local levels, but also worldwide (European Commission, n.d.). The authors state that the CE document package includes the provisions of Agenda 2030. The CE action plan will be instrumental in reaching the Sustainable Development Goals (SDGs) by 2030, in particular Goal 12, i.e. ensuring sustainable consumption and production patterns (United Nations General Assembly's *2030 Agenda for Sustainable Development*).

4. EU waste regulation after amendments, according to the Proposal for Legislative Package (COM (2015) 595 final)

As discussed above, the proposals are aimed at amending six Directives addressing the management of different wastes. The changes to the law documents mentioned are based on Articles 192(1) and 114 of the TFEU:
- Directive (EU) 2018/851 (hereinafter – D 2018/851) of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste (The Waste Framework Directive, hereinafter – WFD 2008).
- Directive (EU) 2018/850 of the European Parliament and of the Council of 30 May 2018 amending Directive 1999/31/EC on the landfill of waste.
- Directive (EU) 2018/849 of the European Parliament and of the Council of 30 May 2018 amending Directives:
  2000/53/EC on end-of-life vehicles,
  2006/66/EC on batteries and accumulators and waste batteries and accumulators,
  2012/19/EU on waste electrical and electronic equipment.
- Directive (EU) 2018/852 of the European Parliament and of the Council of 30 May 2018 amending Directive 94/62/EC on packaging and packaging waste.

The main objectives of these changes are to improve waste management in the EU, and thereby to contribute to the protection, preservation, and improvement of the quality of the environment, and to the prudent and rational utilisation of natural resources. A systematic assessment of the six Waste Directives to be amended presupposes the need to identify and analyse such basic features.

4.1. Main targets of EU waste regulation

The amended Article 1 of WFD 2008/98/EC, establishes a new provision and divulges the main targets of waste regulation. The subject matter and scope, according to Article 1, lays down measures to protect the environment and human health by preventing or reducing the generation of waste and the adverse impacts of the generation and management of waste, as well as by reducing the overall impacts of resource use and improving the efficiency of such use, both of which are crucial for the transition to a circular economy and for guaranteeing the EU's long-term competitiveness. The content of these provisions is disclosed through the systematic interpretation of other provisions of this document: Article 4 and Article 13. Article 4 reveals the content of waste hierarchy: as a priority order in waste prevention and management legislation and policy. Article 13 establishes the imperative to ensure that waste management is carried out without endangering human health, and without harming the

environment. The CJEU ruled that, whilst Article 13 does not specify the actual content of the measures which must be taken in order to ensure that waste is thus managed without endangering human health and without harming the environment, it is nonetheless true that the article is binding on the Member States as to the objective to be achieved, whilst leaving them a margin of discretion in assessing the need for such measures (*Commission v. Slovenia*, C-153/16). The objects of waste management systems mentioned above are established in all EU Waste Directives such that waste management in the Union should be improved with a view to: protecting, preserving, and improving the quality of the environment; protecting human health; ensuring the prudent, efficient, and rational utilisation of natural resources; and promoting the principles of the circular economy (Directive (EU) 2018/850, Directive (EU) 2018/849).

According to the above, EU waste management regulation includes economic factors (competitiveness, the circular economy, and qualitative standards) and environmental protection (environment, human health, and ensuring the prudent, efficient and rational utilisation of natural resources).

4.2. The harmonization of definitions related to the concept of waste

The circular economy document package emphasizes problematic aspects related to the content of definitions. The problems of definitions concern not only their content, but also involve the development of the waste management system. For example, to ensure the effectiveness of the concepts in practice, quality standards (secondary raw materials), cycles of processes (waste hierarchy), control mechanisms (quantitative and qualitative), and waste classification (hazardous/non-hazardous) are established.

To ensure simplification and the more effective implementation of EU legislation, CE documents propose:
a) to avoid overlaps amongst waste targets and calculation methods;
b) to implement harmonization of definitions (European Commission, 2014; 2015a).
Recitals 9 and 47 of Directive (EU) 2018/851 establish the alignment of the definitions in all Waste Directives and provide for new categories of definitions. Recital 9 specifies that the definitions of non-hazardous waste, municipal waste, construction and demolition waste, food waste, material recovery, backfilling, and extended producer responsibility schemes need to be included in Directive 2008/98/EC so that the scope of these concepts is clarified.

Article 3 of WFD 2008 reveals definitions related to waste management. Analysis of this provision leads to the conclusion that the harmonization of waste definitions will also include the replacement of existing norms. For example, in the definitions of *bio-waste* or *waste management*, the meaning of waste management is extended to include sorting activity.

Recitals of Directives D 2018/852 (amending Directive 94/62/EC on packaging and packaging waste) and D 2018/850 (amending Directive 1999/31/EC on the landfill of waste) highlighting WFD 2008 priority over other Waste Directives, as a legal category, solve the issue of alignment of the definitions: "in order to ensure greater coherence in Union waste law, the definitions in Directive 94/62/EC (or Directive 1999/31/EC) should be aligned, where relevant, with those of Directive 2008/98/EC of the European Parliament and of the Council which is applicable to waste in general". The provisions of amendments to Directive 1999/31/EC and Directive 94/62/EC establish a rule that the definitions of *waste*, *waste management*, *collection*, *separate collection*, *prevention*, *reuse*, *treatment*, *recovery*, *recycling*, *disposal*, and *extended producer responsibility scheme* laid down in Article 3 of WFD 2008 shall apply.

Although the WFD was endorsed in 2008, only 10 years later was a definition of municipal waste established. *Municipal waste* means: (a) mixed waste and separately collected waste from households, including paper and cardboard, glass, metals, plastics, bio-waste, wood, textiles, packaging, waste electrical and electronic equipment, waste batteries and accumulators, and bulky waste, including mattresses and furniture; or (b) mixed waste and separately collected waste from other sources, where such waste is similar in nature and composition to waste from households (WFD 2008). Thus the definition of waste management is revealed, emphasizing: a) the physical and chemical nature of waste (for example bulky waste is similar in nature and composition – i.e. is usually glass, wood, or textile); b) type of waste (mixed waste, bio-waste, bulky waste, waste batteries); c) source (waste from households or waste from other sources); and d) specific items (mattresses, furniture, batteries).

Researchers state that this definition is not accurate because it poses some theoretical questions. For example, what is the meaning of such a definition as *bulky waste*, *mixed waste*, *furniture*, or *waste from other sources* (WFD 2008)? The concept of municipal waste must be interpreted systematically within the concept of waste. It should be noted that the concept of waste has remained unchanged: *waste* means any substance or object which the holder discards or intends or is required to discard (WFD 2008). To reveal a clear meaning of waste is not simple. Firstly, it is necessary to assess what is not waste – cases that shall be excluded from the scope of WFD 2008 (Article 2). Secondly, to identify *end-of-waste* status (Article 6) or if a substance or object is considered not to be waste, but to be a *by-product* if the conditions mentioned in Article 5 are met.

The concept of waste is widely discussed among researchers and in the decisions of the CJEU. Some authors describe waste as objects that have an economic value, which may manifest in positive or negative aspects. L. Kramer states that "wastes are physical objects and as such are capable of being traded between Member States, and a buyer might have an interest in acquiring waste which has an economic value" (2012, pp. 76–77.). M. Grosz perceives "waste as a material or an assembly of materials with negative value" (2011, p. 8). Others note that waste contains the same materials as are found in useful products; it only differs from useful production by its lack of value (White, Franke, & Hidle, 1999).

Some authors highlight classification of criteria which divulge the concept of waste. Waste takes on various material forms and can feature any of the three classic aggregate phases: it may occur as a solid material, in liquid form, or even as a gaseous emission (Grosz, 2011). Sources of wastes are as follows: domestic wastes; commercial wastes; ashes; animal wastes; biomedical wastes; construction wastes; industrial solid wastes; sewers; biodegradable wastes; non-biodegradable wastes; and hazardous wastes (Demirbas, 2011). Authors on this topic additionally highlight such criteria as inert waste, processed waste, and unprocessed waste.

It should be noted that there exists another concept of waste – *waste* as an action. This requires a discussion on the content of waste based on the concept of *discarding*: the holder discards, or intends, or is required to discard an object (WFD 2008). This legal definition resembles the everyday understanding of waste – as something that we discard or throw away into the rubbish bin, using three alternatives: (1) which the holder discards; or (2) intends; or (3) is required to *discard* (Fisher, Lange, & Scotford, 2019, p. 521). However, as mentioned, no definition of the term discard is given in the WFD 2008. This situation creates a broad definition of *waste* and a lack of clarity as to its precise meaning, which continues to provide difficulties in national implementation of the WFD 2008 and its subsequent daughter directives (Davies, 2017, pp. 226–228).

The CJEU, ruled to interpret the concept of waste widely, and the meaning *waste* is to be inferred primarily from the holder's actions and the meaning of the term *discard* (*Openbaar Ministerie v. Tronex BV*, Case C-624/17; *Shell Nederland Verkoopmaatschappij BV and Belgian Shell NV,* Case C-241/12). The term *discard* covers both

disposal and *recovery* of a substance or object (*Inter-Environnement Wallonie ASBL v. Région wallonne*, Case C-129/96).

The Court also indicated that the existence of waste within the meaning of WFD 2008, must be determined in the light of all of the circumstances, and must be held to the aim of that directive and ensure that its effectiveness is not undermined. For example, an object or substance in question is not or is no longer of any use to its holder (constituting a burden and possessing the criterion to discard); or there is a degree of probability that goods, a substance, or a product will be reused without a prior processing operation (constituting a criterion to reuse, and not to discard; *Commission v. Italy*, Case C-263/05).

Based on the analysed data, the authors argue that the EU legal regulation develops the concept of definitions regarding the waste. It is possible to identify the classification of waste types and the systematic improvement (harmonization) of the content of definitions of waste. On the other hand, the concept of waste needs to be improved, which must meet the requirements of the waste hierarchy. Analysis of the CJEU judgments revealed a tendency whereby the meaning of the concept of waste is discussed in the context of waste hierarchy, for example the term *discard* manifesting in the stages of recovery or disposal. The authors agree with the provision that "the legal definition of waste overlooks the context of waste, fails to consider the interests of the waste user as opposed to the waste holder, and aims to control the impacts of careless discarding rather than stimulating careful discarding" (Ewijk & Stegemann, 2020).

4.3. Waste hierarchy

The waste hierarchy establishes a priority order for prevention, preparation for reuse, recycling, and energy recovery through disposal, such as landfilling (European Commission, 2015a). Article 4 of WFD 2008 establishes the main elements (steps) of waste hierarchy: (a) prevention; (b) preparing for reuse; (c) recycling; (d) other recovery, e.g. energy recovery; and (e) disposal. According to Article 4 of Directive 2018/851, the following paragraph is added: "3. Member States shall make use of economic instruments and other measures to provide incentives for the application of the waste hierarchy, such as those indicated in Annex IVa or other appropriate instruments and measures". Annex IV divulges examples of economic instruments and other measures to provide incentives for the application of the waste hierarchy. These instruments include: charges and restrictions for using landfill and the incineration of waste, which incentivise waste prevention and recycling whilst keeping landfill the least preferred waste management option; fiscal incentives for the donation of products, in particular food; and the phasing out of subsidies which are not consistent with the waste hierarchy. Such measures are established in order to contribute to achieving the objectives laid down in Article 1 of the WFD 2008.

Waste hierarchy manifests as an obligatory imperative to Member States' waste management systems. Member states must undertake measures to prevent waste generation and ensure that waste undergoes preparation for reuse, recycling, or other recovery operations, and monitor and assess the implementation of waste prevention measures. For that purpose, they must use appropriate qualitative or quantitative indicators and targets, notably on the quantity of waste that is generated (WFD 2008).

The CJEU ruled that waste hierarchy must be revealed in the light of WFD 2008 Article 13: "Member States take the necessary measures to ensure that waste management is carried out without endangering human health and without harming the environment, in particular without risk to water, air, soil, plants or animals" (*"Verdi Ambiente e Società – Aps Onlus" (VAS) and "Movimento Legge Rifiuti Zero per l'Economia Circolare" Aps v. Presidente del Consiglio dei Ministri and Others*, Case C-305/18). In that regard, the Court has already ruled that,

whilst Article 13 does not specify the actual content of the measures which must be undertaken in order to ensure that waste is managed without endangering human health and without harming the environment, it is nonetheless true that that article is binding on the Member States as to the objective to be achieved, whilst leaving them a margin of discretion in assessing the need for such measures (*Commission v. Slovenia*, Case C-153/16).

Is the waste hierarchy mechanism enshrined in all of the Waste Directives? As mentioned above, the main target of the CE Documents Package is the alignment of definitions, and the greater harmonization and simplification of the legal framework of waste management. Recital 6 of Directive D 2018/849 (amending Directives 2000/53/EC, 2006/66/EC, 2012/19/EU) reveals: "The waste hierarchy laid down in WFD 2008 applies as an order of priority in the Union waste prevention and management legislation. When complying with the objectives of this Directive, Member States should take the necessary measures to take the order of priorities of the waste hierarchy into account and ensure the practical implementation of those priorities". Article 6 of Directive 2000/53/EC is amended as follows: "Member States shall take the necessary measures to ensure that all end-of-life vehicles are stored (even temporarily) and treated in accordance with the waste hierarchy and the general requirements laid down in Article 4 of WFD 2008". Article 22a, inserted into Directive 2006/66/EC, divulges incentives for the application of the waste hierarchy: "in order to contribute to the objectives laid down in this Directive, Member States may make use of economic instruments and other measures to provide incentives for the application of the waste hierarchy, such as those indicated in Annex IVa to the WFD 2008". The same principle is laid down in the provisions of Article 16a, inserted into amended Directive 2012/19/EU. The replaced article of Directive 94/62/EC on packaging and packaging waste stated that "In line with the waste hierarchy laid down in Article 4 of WFD 2008, Member States shall take measures to encourage the increase in the share of reusable packaging placed on the market and of systems to reuse packaging in an environmentally sound manner". With a view to supporting the Union's transition to a circular economy and meeting the requirements of WFD 2008 of the European Parliament and of the Council (1), and in particular Articles 4 and 12 thereof, the aim of this Directive is to ensure a progressive reduction in the landfilling of waste (Directive 1999/31/EC on the landfill of waste).

Based on the provisions mentioned, the authors argue that waste hierarchy, according to the CE documents package, is established as an imperative provision of EU waste regulation, including all key waste streams. This disclosure exists with the provision that waste hierarchy exists as *Lex specialis* (the doctrine states that if two laws govern the same factual situation, a law governing a specific subject matter (*lex specialis*) overrides a law governing only general matters (*lex generalis*). The content of imperative meaning consists of waste hierarchy stages, and the monitoring and assessment of qualitative or quantitative indicators and targets. Waste hierarchy manifests as a systematic phenomenon, which includes not only its obligatory nature, but also its status as an economic instrument to provide incentives for the application of the waste hierarchy.

5. Conclusions

The implementation of the circular economy concept of the EU had an important impact on the legal regulation of waste in the Union. Six directives have been amended: Waste Framework Directive 2008/98/EC; Directive 1999/31/EC on the landfill of waste; Directives 2000/53/EC on end-of-life vehicles; 2006/66/EC on batteries and accumulators and waste batteries and accumulators; 2012/19/EU on waste electrical and electronic equipment; and Directive 94/62/EC on packaging and packaging waste. The systematization of Waste Directives presupposes a conclusion that Waste Framework Directive 2008/98/EC discloses waste regulation as a fundamental Directive in the EU. The provisions of amended Waste Directives established references or priorities to Waste Framework Directive 2008/98/EC, interpreting the principles, definitions, or main targets of waste management. All disputes concerning the definition of the Directives should be guided by the Waste Framework Directive 2008/98/EC

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

The authors conclude that the main elements of change in EU waste regulation must be the systematization of Waste Directives, the alignment and improvement of definitions related to the concept of waste, and ensuring the implementation of waste hierarchy and the targets of the waste management system. The waste hierarchy establishes a priority system within waste management, covering all types of waste. Waste hierarchy as legal imperative is established in all six amended Waste Directives, and manifests as a systematic phenomenon which includes imperative waste hierarchy stages, the monitoring and assessment of qualitative or quantitative indicators, and targets and economic instruments to provide incentives for the application of the waste hierarchy.

The new version of the Waste Framework Directive 2008/98/EC established new definitions (municipal waste) related to the concept of waste, as well as improving existing ones (waste management). It should be noted that the basic definition of waste remains unchanged. Analysis of the CJEU jurisprudence revealed arguments that waste definition exists as a problematic legal issue. The authors believe that the concept of waste needs to be improved in the light of the waste hierarchy, circular economy, and the CJEU jurisprudence. The authors conclude that the Directives should clearly and unambiguously define the concept of the circular economy.

References

"Associazione Verdi Ambiente e Società – Aps Onlus" (VAS) and "Movimento Legge Rifiuti Zero per l'Economia Circolare" Aps v. Presidente del Consiglio dei Ministri and Others, Case C-305/18 (CJEU 2019).

Commission v. Italy, Case C-263/05 (CJEU 2007).

Commission v. Slovenia, C-153/16 (CJEU 2017).

Decision No. 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet'. *Official Journal of the European Union*, L 354/171. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013D1386&from=EN

Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste. *Official Journal of the European Union*, L 150, 109–140. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32018L0851

Directive (EU) 2018/850 of the European Parliament and of the Council of 30 May 2018 amending Directive 1999/31/EC on the landfill of waste. *Official Journal of the European Union*, L 150/100. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L0850&from=lt

Directive (EU) 2018/849 of the European Parliament and of the Council of 30 May 2018 amending Directives: 2000/53/EC on end-of-life vehicles, 2006/66/EC on batteries and accumulators and waste batteries and accumulators, and 2012/19/EU on waste electrical and electronic equipment. *Official Journal of the European Union*, L 150/93. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L0849&from=LT

Directive (EU) 2018/852 of the European Parliament and of the Council of 30 May 2018 amending Directive 94/62/EC on packaging and packaging waste. *Official Journal of the European Union*, L 150, 141–154. Retrieved from https://eur-lex.europa.eu/legal-content/lt/TXT/?uri=CELEX%3A32018L0852

Demirbas, A. (2011). Waste management, waste resource facilities and waste conversion processes. *Energy Conversion & Management, 52*(2), 1280–1282. https://doi.org/10.1016/j.enconman.2010.09.025

Davies, P. (2017). *European Union environmental law: An introduction to key selected issues*. New York: Routlege.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Elkington, J. (1997). *Cannibals with forks. The triple bottom line of 21st century*. Hoboken, NJ: John Wiley & Son.

Ewijk, S., & Stegemann, J. A. (2020). Recognising waste use potential to achieve a circular economy. *Waste Management*, *105*, 1–7. https://doi.org/10.1016/j.wasman.2020.01.019

European Environmental Agency. (2018). *Air quality in Europe – 2018 report* (EEA Report No. 12/2018). Retrieved from https://www.eea.europa.eu/publications/air-quality-in-europe-2018

Eurostat. (2019). *Energy, transport and environment statistics – 2019 edition*. Luxembourg: Publications Office of the European Union. Retrieved from https://ec.europa.eu/eurostat/web/products-statistical-books/-/KS-DK-19-001

European Commission. (2014). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Towards a circular economy: A zero waste programme for Europe. COM (2014) 0398 final*. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52014DC0398

European Commission. (2015a). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Closing the loop – an EU action plan for the circular economy. COM (2015) 614 final*. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52015DC0614

European Commission. (2015b). *Proposal for amending Directive 2008/98/EC on waste. COM (2015) 595 final – 2015/0275 (COD)*. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52015PC0595&from=EN

European Commission. (n.d.) Multilateral Environmental Agreements. Retrieved from https://ec.europa.eu/environment/international_issues/agreements_en.htm

Fisher, E., Lange, B., & Scotford, E. (2019). *Environmental law: Text, cases and materials* (2nd ed.). Oxford: Oxford University Press.

Geissdoerfer, M., Savaget, P., Bocken, N., & Hultink, E. (2017). The circular economy – a new sustainability paradigm? *Journal of Cleaner Production*, *143*: 757–768, https://doi.org/10.1016/j.jclepro.2016.12.048

Grosz, M. (2011). *Sustainable waste trade under WTO law: Chances and risks of the legal frameworks*. Zurich: Hotei.

Inter-Environnement Wallonie ASBL v. Région wallonne, Case C-129/96 (CJEU 1997).

Kramer, L. (2012). *EU environmental law* (7th ed.). London: Thomson Reuters.

Langen, P., & Sorn-Friese, H. (2019). Ports and the circular economy. In R. Bergqvist & J. Monios (Eds.), *Green ports: Inland and seaside sustainable transportation strategies* (pp. 85–108). Elsevier. https://doi.org/10.1016/B978-0-12-814054-3.00005-0

Limba, T., Novikovas, A., Stankevičius, A., Andrulevičius, A., & Tvaronavičienė, M. (2020). Big data manifestation in Municipal waste management and cryptocurrency sectors: Positive and negative implementation factors. *Sustainability, 12*(7), 2862. https://doi.org/10.3390/su12072862

Moumen, Z., El Idrissi, N. E. A., Tvaronavičienė, M., & Lahrach, A. (2019). Water security and sustainable development. *Insights into Regional Development*, *1*(4), 301–317. https://doi.org/10.9770/ird.2019.1.4(2)

Novikovas, A., & Stankevičius, A. (2018). Municipal waste, as critical infrastructure, management: Case of Lithuania. *Journal of Security and Sustainability Issues*, *8*(2), 257–265. https://doi.org/10.9770/jssi.2018.8.2(12)

Openbaar Ministerie v. Tronex BV, Case C-624/17 (CJEU 2019).

Pechancová, V., Hrbáčková, L., Dvorský, J., Chromjaková, F., & Stojanovic, A. (2019). Environmental management systems: an effective tool of corporate sustainability. *Entrepreneurship and Sustainability Issues*, *7*(2), 825841. http://doi.org/10.9770/jesi.2019.7.2(3)

Sauvé, S., Bernard, S., & Sloan, P. (2016). Environmental sciences, sustainable development and circular economy: alternative concepts for transdisciplinary research. *Environmental Development*, *17*, 48–56. https://doi.org/10.1016/j.envdev.2015.09.002

Shell Nederland Verkoopmaatschappij BV and Belgian Shell NV, Case C-241/12 (CJEU 2013).

Tura, N., Hanski, J., Ahola, T., Ståhle, M., Piiparinen, S., & Valkokari, P. (2019). Unlocking circular business: A framework of barriers and drivers. *Journal of Cleaner Production*, *212*, 90–98. https://doi.org/10.1016/j.jclepro.2018.11.202

Tvaronavičienė, M. (2016). Entrepreneurship and energy consumption patterns: case of households in selected countries. *Entrepreneurship and Sustainability Issues*, 4(1): 74–82. https://doi.org/10.9770/jesi.2016.4.1(1)

United Nations World Commission on Environment and Development. (1987). *Report of the World Commission on Environment and Development: Our Common Future*. Retrieved from https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf

United Nations General Assembly, *Transforming our world: the 2030 Agenda for Sustainable Development*, 21 October 2015, A/RES/70/1. Retrieved from https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E

White, R. P., Franke, M., & Hindle, P. (1999). *Integrated solid waste management: A lifecycle inventory*. Berlin: Springer.

Andrejus NOVIKOVAS, Institute of Public Law at the Law School at Mykolas Romeris University. Research interests: administrative law, legislative process, public security.
ORCID ID: https://orcid.org/0000-0002-2715-1402

Audrius BAKAVECKAS, Institute of Public Law at the Law School at Mykolas Romeris University. Research interests: administrative law, legislative process.
ORCID ID: https://orcid.org/0000-0002-2840-1290

Andrius STANKEVIČIUS, Institute of Public Law at the Law School at Mykolas Romeris University. Research interests: public security, interest groups, lobbying, waste management, big data.
ORCID ID: https://orcid.org/0000-0002-2528-0497

Oleh PETRYSHYN, Department of the EU Law at Yaroslav Mudryi National Law University. Research interests: Ukraine's EU cooperation and integration policies, state-building, local self-government, and human rights.
ORCID ID: https://orcid.org/0000-0002-6099-8832

**ENTREPRENEURSHIP AND
SUSTAINABILITY CENTER**

Publisher
http://jssidoi.org/esc/home

STRIKING A HEALTHIER BALANCE BETWEEN AIR PASSENGER RIGHTS AND AIR CARRIERS' VITAL INTERESTS IN THE LIGHT OF COVID-19

Regina Valutytė

Mykolas Romeris University, Ateities Str. 20, Vilnius, Lithuania

E-mail: r.valutyte@mruni.eu

Abstract. Regulation 261/2004 is a directly applicable EU legal act establishing common rules on compensation and assistance to passengers in the event of denied boarding, flight cancellations, or long delays of flights. The 'extraordinary circumstances defence' is expressly provided by Regulation 261/2004, in favour of air carriers to justify the refusal to pay compensation to passengers. However, the concept of extraordinary circumstances is far from being clear, and continuously raises questions of interpretation. Covid-19, as an extraordinary circumstance, brings previous discussions on the weaknesses of Regulation 261/2004 back to light, particularly regarding the extent of air passengers' rights embedded in Regulation 261/2004. Accordingly, this research aims to discuss whether the Regulation ensures the proper balance between the interests of passengers and air carriers in emergencies like Covid-19. Possible developments of existing regulation, allowing for the striking of a better balance between the interests of the aviation industry and consumer rights in situations like Covid-19, and thus ensuring the sustainability of the aviation market, are discussed. The discussion focuses on the regulation surrounding vouchers as an alternative method of reimbursement in case of the cancellation of a flight, and the extent of the right to offer assistance and care to passengers awaiting another flight.

Keywords: aviation; air passenger rights; extraordinary circumstances; Regulation 261/2004; Covid-19

1. Introduction

On 30 January 2020, the United Nations World Health Organization (hereinafter – WHO) declared the Covid-19 outbreak a 'public health emergency of international concern' (WHO, 2020a) which, on 11 March 2020, was characterised as a pandemic (WHO, 2020c). Efforts to tackle the pandemic's spread resulted in the imposition of

travel restrictions and the suspension of flights. The United Nations World Tourism Organization reports that as of 31 May 2020, 100% of all destinations worldwide had some forms of Covid-19-related travel restrictions. As of 18 May 2020, 75% of the destinations continued to have their borders completely closed for international tourism. In 37% of all cases, travel restrictions have been in place for 10 weeks, while 24% of global destinations had restrictions in place for 14 weeks or more (United Nations World Tourism Organization, 2020).

As the Great Depression did in its time, the Great Lockdown continues to have a tremendous economic impact (International Monetary Fund, 2020), with the aviation industry hit the hardest among other sectors. The world's total passenger traffic is forecast to decrease drastically. For instance, the International Civil Aviation Organization (hereinafter – ICAO) indicates that for the full year of 2020, the impact of Covid-19 would imply an overall decrease ranging from 46% to 51% of seats offered by airlines. Concerning passengers, it foresees an overall decrease of 2.605 to 2.894 million of passengers (predictions based on the traffic data as of 19 August 2020; International Civil Aviation Organization, 2020). As a result, the pandemic has had a tremendous impact on airlines' financial situations, and the ICAO (2020) estimates approximately USD 214 billion in passenger revenue loss from January to July 2020. The pandemic has created an 'unprecedented disruption' (Partington & Partridge, 2020) in aviation, and many airlines are relying on governmental financial assistance to stay afloat. The International Air Transport Association (hereinafter – IATA) does not expect any recovery from this until 2023 (International Air Transport Association, 2020).

Alongside this, the European Commission observes that the economic impact of the crisis has also affected travellers, since their income has reduced as a result of the curtailment of economic activities (European Commission, 2020a, para. 13). Regulation (EC) No. 261/2004 of the European Parliament and of the Council of 11 February 2004, *establishing common rules on compensation and assistance to passengers in the event of denied boarding and of cancellation or long delay of flights, repealing Regulation (EEC) No 295/91* (hereinafter – Regulation 261/2004), establishes the obligations of air carriers to offer, depending on the situation, reimbursement (refund), re-routing at the earliest opportunity, or re-routing at a later date at the passenger's convenience, compensation, care, and assistance to air passengers. The Regulation foresees the concept of extraordinary circumstances (arguably such as Covid-19), where the air carrier is exempted from the obligation to pay compensation. However, no differentiation of extraordinary circumstances based on their severity is envisaged in terms of air passenger protection. Covid-19 has brought back the discussion of the imbalance between the interests of passengers and air carries embedded in the Regulation, which was last provoked by the eruption of the Icelandic volcano Eyjafjallajökull, and was followed by scholarly reflection (Abeyratne, 2010; Correia, 2014). In the case of the pandemic, numerous cancellations of flights have led to an unsustainable cash-flow and revenue situation for air carriers (European Commission, 2020a, para. 14), since financially struggling airlines face numerous refund claims instead of travellers accepting vouchers for future flights (a relatively new practice developed by air carriers during Covid-19). Therefore, the question of the feasibility of introducing vouchers as an alternative at the discretion of the air carrier in such circumstances as Covid-19 has become of particular relevance.

Accordingly, the purpose of this article is to discuss whether Regulation 261/2004 ensures a proper balance between the interests of passengers and air carriers in emergencies such as Covid-19. To this end, this analysis will focus on the extent of the rights of passengers whose flights are cancelled or delayed in exceptional circumstances which have a devastating economic impact on air carriers. Based on the textual and teleological interpretation of the Regulation 261/2004, as well as the practice of the Court of Justice of the European Union (hereinafter – CJEU), this article will reconstruct the concept of extraordinary circumstances under the Regulation in relation to a specific context of Covid-19. Subsequently it will discuss the conditions activating air carriers' obligations towards air passengers in the cases of cancellation and delays. It will also consider the possible

development of existing Regulation that would allow the striking of a better balance between the interests of the aviation industry and consumer rights in situations such as Covid-19, and thus ensure the sustainability of the aviation market.

2. Covid-19 as an extraordinary circumstance

Regulation 261/2004 does not define *extraordinary circumstances*; however, Recital 14 of the preamble to the Regulation hints at some relevant features of the concept. Therein, the legislator refers to the 'circumstances which could not have been avoided even if all reasonable measures had been taken', an expression that, excluding the preamble, is mentioned three times in the main text of the Regulation (Recital 12, Recital 15, and Article 5). Since the concept lacks clarity, it was inevitable that the circumstances in which this defence is available would become a matter of dispute (Balfour, 2009, p. 225).

Having the exclusive competence to provide binding interpretations to the unclear provisions of EU law, the CJEU has continuously assisted the aviation industry and passengers with the interpretation of the concept of extraordinary circumstances. As Pierallini aptly phrased it, the Court 'has innovated the interpretation of Regulation 261/2004 with regards to compensation for flights' (2013, p. 120). The case of *Friederike Wallentin-Hermann v. Alitalia* (2008) is one of the best examples of the CJEU's active role in forming the practice of the implementation of the Regulation in using the extraordinary circumstances defence to avoid liability against passengers.

In *Friederike Wallentin-Hermann v. Alitalia*, the CJEU confirms two key aspects relevant to the concept of extraordinary circumstances embedded in the Regulation. Firstly, the statement in Recital 14 of the Regulation's preamble contains no list of extraordinary circumstances themselves, but only the events that may produce such circumstances (*Friederike Wallentin-Hermann v. Alitalia*, 2008, para. 21). Secondly, the Regulation does not provide an exhaustive list of these events either. The examples mentioned in Recital 14 (cases of political instability, meteorological conditions incompatible with the operation of the flight concerned, security risks, unexpected flight safety shortcomings, and strikes that affect the operation of an air carrier) are regarded as events that have great potential but may not necessarily produce exceptional circumstances (*Friederike Wallentin-Hermann v. Alitalia*, 2008, para. 22). Relying on this interpretation of Recital 14, the Court establishes two cumulative conditions for characterizing an event as extraordinary: 1) the event by nature or origin must not be inherent in the normal exercise of the activity of the air carrier concerned; and 2) the event must be beyond the actual control of that carrier on account of its nature or origin (*Friederike Wallentin-Hermann v. Alitalia*, 2008, para. 23).

The CJEU has remained consistent and clear in developing its case-law regarding the air passengers' rights. Consumer protection lies at the heart of the Regulation; therefore, any terms that may restrict air passengers' rights must be interpreted strictly (*Friederike Wallentin-Hermann v. Alitalia*, 2008, para. 17). In this context, as Prassl (2016, p. 138) accurately concludes, the extraordinary circumstances defence must be interpreted narrowly. As demonstrated below, the well-established case-law shows that the Court strictly adheres to this rule while interpreting whether certain events qualify as extraordinary circumstances.

Among the circumstances characterized as extraordinary, the CJEU has accepted: some technical problems (*Corina van der Lans v. Koninklijke Luchtvaart Maatschappij NV*, 2015, para. 38); a collision between an aircraft and a bird (Peskova, 2017, para. 24); the behaviour of unruly passengers (*LE v. Transportes Aéreos Portugueses*

SA, 2020, para. 48); the consequences of a volcanic eruption (*Denise McDonagh v. Ryanair Ltd*, 2013, para. 24); and damage caused by an unexpected object on the airport runway (*Germanwings GmbH v. Wolfgang Pauels*, 2019, para. 26). On the contrary, technical problems such as: a collision with mobile stairs (*Sandy Siewert and Others v. Condor Flugdienst GmbH,* 2014, para. 19); failure resulting from the inadequate maintenance of an aircraft (*A and Others v. Finnair Oyj*, 2020, para. 42); and a wildcat strike among the staff of the air carrier (*Helga Krüsemann and Others v. TUIfly GmbH*, 2018, 42) did not amount to extraordinary circumstances.

In *Friederike Wallentin-Hermann v. Alitalia* (2008, para. 25), the CJEU suggested that technical problems that came to light during aircraft maintenance or are caused by the failure to maintain an aircraft could not be regarded as extraordinary circumstances, since such a breakdown remains intrinsically linked to the operating system of the aircraft. In *Corina van der Lans v. Koninklijke Luchtvaart Maatschappij NV* (2015, para. 14, 18), as was expected due to the lack of clarity in the Court's ruling in *Friederike Wallentin-Hermann v. Alitalia* (Croon, 2015, p. 335), the Luxembourg court did not accept KLM's arguments that spontaneous technical problems, as opposed to technical issues discovered during routine maintenance checks of the aircraft, constitute an extraordinary circumstance. In line with the principle of a strict interpretation of consumer rights limitations, the Court elaborated in para. 38 and 40 that technical problems might constitute extraordinary circumstances if 'not only that specific aircraft but also others in the fleet had been affected by a hidden manufacturing defect affecting the safety of flights'.

Contrary to the suggestions of Advocate General Bots (2016, para. 42), a collision between an aircraft and a bird, as well as any damage caused by that collision, was also recognized as 'out of the ordinary' and 'out of control' in *Marcela Pešková and Jiří Peška v. Travel Service a.s.* (2017, para. 24). The Court classified such a collision as extraordinary circumstances, clearly linking its finding with the non-existence of the 'intrinsic linkage' of the event to the operating system of the aircraft (2017, para. 24).

In the most recent case of *LE v. Transportes Aéreos Portugueses SA*, the Court accepted that 'unruly behaviour of such gravity as to justify the pilot in command diverting the flight concerned is not inherent in the normal exercise of the activity of the operating air carrier concerned' (2020, para. 41). The Court established the standards of a responsible passenger, who normally complies with all orders issued by the commander to ensure safety on board and ensures that they do not themselves jeopardize the proper performance of the contract of carriage between themselves and the operating air carrier concerned (2020, para. 42). As to the second condition, the CJEU gave instructions for assessing if the behaviour of such a passenger is out of the control of the air carrier concerned. In such cases, one has to ascertain the contribution of the air carrier to the occurrence of the unruly behaviour of the passenger, or the possibility to anticipate unruly behaviour and take appropriate measures at a time when it was possible to do so without any significant consequence for the operation of the flight concerned based on the warning signs of such behaviour (2020, para. 45).

In *Sandy Siewert and Others v. Condor Flugdienst GmbH* (2014), the CJEU noted that mobile stairs or gangways could be regarded as indispensable to air passenger transport, and air carriers were regularly faced with situations arising from the use of such equipment. The use of equipment that enables passengers to enter or leave the aircraft, in the Court's view, falls within normal airport services (2014, para. 19), and thus may not be regarded as an extraordinary circumstance. Likewise, in *Helga Krüsemann and Others v. TUIfly GmbH*, the Court did not accept that a wildcat strike among the staff of the air carrier might constitute extraordinary circumstances, since the restructuring and reorganization of undertakings, which the wildcat strike followed in *TUIfly* case, are part of the normal management of legal entities (2018, para. 40, 42).

The case-law, as mentioned earlier, demonstrates that the decisive factor governing a certain circumstance's characterization as extraordinary is its attribution to the factors lacking intrinsic linkage with the operating system of the aircraft or the usual management of airlines. Whether the factor is internal or external to the aircraft or airlines is not an important factor for this determination.

As regards the Covid-19 pandemic, the European Commission considers that the measures intended to contain the Covid-19 pandemic taken by public authorities are by their nature and origin not inherent in the normal exercise of the activity of carriers, and are outside of their actual control (European Commission, 2020a, para. 3.4). To justify this statement, it is necessary to discuss if a spreading disease meets the above-mentioned cumulative criteria.

Pandemic, epidemic, endemic, and outbreak are often misused terms (Dietz & Black, 2012, p. xxvii; Grennan, 2019). These terms are commonly used to describe infections; however, they are primarily based on how many cases of a condition there are compared with the expected number of cases over a given time, and the geographical spreading of the cases (Grennan, 2019). Diseases that are constantly present in a population within a particular geographic region are called endemic diseases **(Grennan, 2019).** For example, malaria is endemic to some regions of the Amazon Brazil, in South and Central America, Africa, and Asia; dengue is common in the Caribbean, Central and South America, Southeast Asia, and the Pacific Islands (Felman, 2020). The terms *outbreak* and *epidemic* are quite often used similarly, and are defined as the occurrence of more cases of disease than expected in a given area or among a specific group of people over a particular period of time (Parthasarathy, 2013, p. 444). An outbreak usually indicates less intensity, and the differentiation is based on the number of cases per number of inhabitants, the percentage of overall deaths causes by the disease, etc. (Parthasarathy, 2013, p. 444). Examples of epidemics include the Zika virus, starting in Brazil in 2014 and spreading to most of Latin America and the Caribbean; or the 2014–2016 Ebola outbreak in West Africa (Grennan, 2019). The WHO defines a pandemic as the worldwide spread of a new disease (WHO, 2010). While an epidemic remains limited to one city, region, or country, a pandemic spreads beyond national borders and possibly worldwide (Felman, 2020). Rare examples of pandemics include the Spanish Flu of 1918, which killed roughly 50 million people worldwide, and the H1N1 virus in 2009 (Felman, 2020).

When Covid-19, which originated in Wuhan, China, was characterized as a pandemic, the disease was widely spread across the world – there were more than 118,000 cases in 114 countries and 4,291 deaths. As of 22 August 2020, 213 countries and territories around the world have reported a total of 23,144,577 confirmed cases of Covid-19 and 803,634 deaths (Worldometer, 2020). Considering the characteristics mentioned above, the Covid-19 pandemic neither by nature nor origin is inherent in the normal exercise of the activity of the air carrier concerned. Owing to its nature or origin this event clearly goes beyond the actual control of air carriers.

However, one must observe that the majority of pandemics or epidemics satisfy the cumulative conditions established in the case-law of the CJEU, since airlines are not linked with their appearance and have no control over them. Abeyratne (2012, p. 115) pays attention to the rule that the extraordinary circumstances defence is not an absolute one; it must be accompanied by the fact that the extraordinary circumstances 'could not have been avoided although the airlines took all reasonable measures. Thus, proving two cumulative conditions for the event to be classified as extraordinary is not enough for the purpose of avoiding liability to pay compensation to passengers. As the European Commission accurately points out, in order to be exempt from the payment of compensation the carrier must simultaneously prove two additional conditions: 1) the causal link between the extraordinary circumstances and the delay or the cancellation; and 2) the fact of inability to avoid the delay or cancellation in spite of all reasonable measures taken (European Commission, 2016, para. 5.1).

As to the causal link, not all pandemics or epidemics lead to a lockdown or restrictions on air transportation. For example, in early 2015 an outbreak of Zika fever in Brazil, caused by the Zika virus, spread to other parts of South and North America, several islands in the Pacific, and Southeast Asia (Sikka et al., 2016). Since the virus was transmitted predominately via mosquito vectors and, possibly, other modes including blood transfusion and sexual intercourse (Sikka et al., 2016), the WHO did not recommend any general restrictions on travel to and from the countries, areas, and/or territories of Zika virus transmission (WHO, 2016). Contrarily, the virus that causes Covid-19 spreads very easily and sustainably between people and from contact with contaminated objects and surfaces, and is particularly dangerous to older people and people with some pre-existing health conditions. Despite the WHO consistently recommending against restrictions on international travel (WHO, 2020b), almost every country in the world implemented some type of mandatory restrictions contrary to the WHO advice (von Tigerstrom & Wilson, 2020).

Therefore, the main reasons for the cancellation of the flights were the border closures of the countries, as implicitly observed by the European Commission in its guidelines (European Commission, 2020a, para. 3.4). These restrictions left no place to manoeuvre for the airlines, and so were the main reason for the cancellation of the flights. Since the CJEU requires a direct causal link between the extraordinary circumstances and the cancellation of the flight (*LE v. Transportes Aéreos Portugueses SA,* 2020, para. 54), one might wonder whether the direct causality may be established only between national bans on international travel and the cancellation of a flight, rather than between cancellations and Covid-19 itself, since despite the ongoing pandemic some airlines have continued to transport passengers where there are no restrictions to air transportation imposed as recommended by the WHO. In the author's view, both factors (Covid-19 itself and national legal measures) are eligible for establishing a direct causal link. State legal measures of a general nature (non-specific to particular air carriers), in particular banning air transportation activities, are widely accepted as extraordinary circumstances due to airlines' inability to impact them. Therefore, airlines may rely on the national legal measures as a direct reason for the cancellation of a flight. On the other hand, airlines may opt not to operate a flight due to the occurrence of Covid-19 itself, even if there are no travel restrictions. As mentioned above, Covid-19 is a pandemic threatening public health worldwide, the virus causing the disease is being transmitted via contaminated surfaces and easily spreading from person to person. Therefore, the virus may pose a risk not only to passengers but also to airline staff, and as such if an airline decides to cancel a flight in the absence of flight bans to a particular country, there still exists a direct causal link between Covid-19 and the cancellation.

The other condition to satisfy exemption from the responsibility to pay compensation is the obligation to take all reasonable measures to avoid extraordinary circumstances. In explaining the scope and extent of reasonable measures, the Court placed emphasis on the balance between the interests of air passengers and air carriers in a number of cases. The Court 'established an individualized and flexible concept of 'reasonable measures', leaving to the national court the task of assessing whether, in the circumstances of the particular case, the air carrier could be regarded as having taken measures appropriate to the situation' (*Andrejs Eglītis and Edvards Ratnieks v. Latvijas Republikas Ekonomikas ministrija*, 2011, para. 30; *Marcela Pešková and Jiří Peška v. Travel Service a.s.*, 2017, para. 30). The CJEU clarified that in order to meet this condition, an air carrier must demonstrate that 'even if it had deployed all its resources in terms of staff or equipment and the financial means at its disposal, it would clearly not have been able, unless it had made intolerable sacrifices in the light of the capacities of its undertaking at the relevant time, to prevent the extraordinary circumstances with which it was confronted from leading to the cancellation of the flight or its delay equal to or in excess of three hours in arrival' (*Christopher Sturgeon and Others*, 2009, para. 61; *Andrejs Eglītis and Edvards Ratnieks v. Latvijas Republikas Ekonomikas ministrija*, 2011,

para. 25; *Germanwings GmbH v. Wolfgang Pauels*, 2019, para. 19; *LE v. Transportes Aéreos Portugueses SA,* 2020, para. 36).

In *Marcela Pešková and Jiří Peška v. Travel Service a.s.* (2017), for example, the Court was not persuaded that the airlines took all of the reasonable measures to avoid the extraordinary circumstances. The CJEU observed that the air carriers were free to use the experts of their choice to carry out the checks necessitated by a collision with a bird. However, when a check had already been carried out after such a collision by an expert authorised to do so under the applicable rules, a second check inevitably leading to a delay equal to or in excess of three hours to the arrival of the flight was not reasonable (2017, para. 37).

The case-law of the CJEU demonstrates that despite the gravity of the situation, which is characterized as extraordinary, air carriers must ensure that all reasonable measures in their hands are deployed to avoid the circumstances and thus mitigate their negative effect. Regarding Covid-19, it is clear that airlines can do nothing to avoid the pandemic, however, they can mitigate the negative impact on passengers by applying the rule established in Article 5(c)(i) of the Regulation which *de jure* exempts them from their liability to pay damages. Under Article 5(c)(i), air carries do not have to pay compensation if they inform the passengers of the cancellation at least two weeks before the scheduled time of departure. Considering that the current case-law of the CJEU is strictly oriented towards consumer protection, the assessment of the measures deployed to make use of this possibility may be a relevant factor for deciding if the air carrier has the obligation to pay compensation, in particular in the situations where the air carrier knows well in advance that the flight will be cancelled due to the closure of the airspace.

3. The extent of passenger rights in the case of Covid-19

Independently from the cause of the cancellation, Article 5 of Regulation 261/204 obliges the operating air carrier to offer the passengers the following choices: reimbursement (refund), re-routing at the earliest opportunity, or re-routing at a later date at the passenger's convenience. The European Commission, in its Interpretative Guidelines, guides passengers on the implementation of the above-mentioned rights (European Commission, 2016). If the outbound flight and the return flight are part of the same booking, even if operated by different air carriers, passengers should be offered two options if the outbound flight is cancelled: to be reimbursed for the whole ticket (i.e. both flights), or to be re-routed onto another flight for the outbound flight (European Commission, 2016, Point 4.2). As regards re-routing, 'the earliest opportunity' may imply considerable delay under the circumstances of the Covid-19 outbreak, and the same may apply to the availability of concrete information on such an opportunity given the high level of uncertainty affecting air travel. However, at any rate passengers should be informed about the delays and uncertainties linked to them choosing a re-routing instead of reimbursement. Should a passenger nonetheless choose re-routing at the earliest opportunity, the carrier should be considered as having fulfilled its information obligation towards the passenger if it communicated the flight available for re-routing on its own initiative, as soon as possible, and in good time (European Commission, 2020a, para. 3.2).

Regarding the form of the reimbursement, it is important to mention that Article 7(3) lists possible forms of reimbursement. Travel vouchers are explicitly mentioned among those forms, however, as the European Commission accurately mentions in its guidelines, the offer of a voucher by the airlines cannot affect the passenger's right instead to opt for cash by electronic bank transfer, bank orders, or bank cheques (European Commission, 2020a, para. 2.2.).

The rationale behind this regulation is clear from the perspective of a passenger. First of all, the trip on the other date may lose its purpose to a particular passenger or limit their opportunities to choose a cheaper option in the market when buying a ticket in the future. Additionally, a situation such as Covid-19 creates the risk of an air carrier becoming insolvent, which could eliminate the passenger's possibilities to make use of a voucher. On the other hand, as the European Commission aptly observes in its recommendation on vouchers offered to passengers and travellers as an alternative to reimbursement for cancelled package travel and transport services in the context of the Covid-19 pandemic (2020a, Recital 14), 'if organisers or carriers become insolvent, there is a risk that many travellers and passengers would not receive any refund at all, as their claims against organisers and carriers are not protected'. Thus, it is in the interest of the better protection of passengers as a whole to ease the liquidity problems of carriers and make sure that once the sky is open again, the air transportation business is viable and competitive.

The question of introducing the option of a voucher as an alternative at the discretion of the air carrier rather than the passenger in exceptional circumstances that threaten the liquidity of air carriers has not been discussed in the latest Proposal for a Regulation of the European Parliament and of the Council amending Regulation 261/2004 (Council of European Union, 2020). Nor was it reviewed in the Proposal for a Regulation of the European Parliament and of the Council amending Regulation 261/2004 (European Commission, 2013), which was widely discussed by different stakeholders without reaching a compromise in the end. The European Commission already aims to encourage the acceptance of vouchers by guiding air carriers towards implementing a set of recommended characteristics to make vouchers an attractive and reliable alternative to monetary reimbursement. Thus, the introduction of a voucher as an equal alternative form of reimbursement upon the choice of the carrier in certain circumstances, combined with all the guarantees afforded to this form of reimbursement, may be worth discussing in seeking to strike a better balance between the sustainability of business and the protection of air passengers as a whole.

4. Care in extraordinary circumstances

Articles 8 and 9 of Regulation 261/2004 include the right of passengers to receive information, meals and refreshments, telephone calls, and accommodation if necessary, as well as transportation to the place of accommodation and back. The right to care begins when a passenger chooses re-routing at a later date at the passenger's convenience (Article 5(1)(b) in conjunction with Article 8(1)(c); European Commission, 2020a, para. 3.3.). Accordingly, airlines do not have the obligation to assist the passengers in the way described in Article 9 if a passenger opts for reimbursement of the full cost of the ticket.

Article 9 seeks that the needs of passengers waiting for their return flight or re-routing are adequately addressed (European Commission, 2020a, para. 3.3.). The European Commission observes that the extent of adequate care is assessed on a case-by-case basis, taking into consideration the needs of air passengers in the circumstances and the principle of proportionality according to the waiting time (European Commission, 2020a, para. 4.3.2.).

The European Commission accepts that the Regulation has no provision allowing airlines to decline to offer care when the cancellation of a flight is caused by circumstances which could not have been avoided even if all reasonable measures had been taken (European Commission, 2020a, para. 4.3.2.). The closure of part of European airspace as a result of the eruption of the Eyjafjallajökull volcano in 2010 provoked the question of the extent of care in the circumstances where, depending on their origin and the scale of the situation, passengers waited for their return flights for weeks.

In this regard, Jones observes that the idea of 'super extraordinary circumstances' was dismissed based on the argument that a full range of extraordinary circumstances had been intended to fall under the term (2016, p. 232). Indeed, the CJEU explained that there was no separate category of 'particularly extraordinary' events, which would exempt the air carrier from offering care to the passengers (*Denise McDonagh v. Ryanair Ltd*, 2013, para. 30). Wijngaart argues that the way the CJEU interprets the extraordinary defence is not in line with the legislator's intent behind the Regulation, and is pessimistic about changing the case-law in the future with this argument (2016, p. 62). In the author's view, the present practice of the Court's may be modified if the relevant changes are introduced in the Regulation text. The CJEU does not ban the possibility of differentiating between extraordinary circumstances based on their gravity in general. Since efforts to revise the Regulation have recently been heightened, there is a chance to revisit the concept of extraordinary circumstances by establishing a special regime for super-extraordinary circumstance (e.g., epidemics, pandemics).

The situation materializing due to Covid-19 has again brought to light the weaknesses of the Regulation. Although the European Commission urges air carries to inform passengers of all the risks associated with the choice of re-routing instead of reimbursement, it does not release them from the obligation of providing care and assistance to passengers waiting at their destination for an undetermined period of time before they can return home, even if they unilaterally assumed the risk of facing an airspace closure. Pinpointing the legislator's choice, the CJEU takes the consumer-oriented approach by stating in *Denise McDonagh v. Ryanair Ltd* that there is no limitation, 'whether temporal or monetary, of the obligation to provide care to passengers in extraordinary circumstances' (2013, para. 40) for the whole period during which the passengers concerned must await their re-routing (para. 41). The Court emphasizes that the importance of the objective of consumer protection, which includes the protection of air passengers, may justify even substantial negative economic consequences for certain economic operators (para. 48), and the consequences as a result of extraordinary circumstances, such as the eruption of a volcano, cannot be considered disproportionate to the aim of ensuring a high level of protection for passengers (para. 50).

Noticing the imbalance between the interests of passengers and air carriers, numerous scholars have continuously requested to pay some consideration to the protection of the interests of airlines, in particular, in face of the circumstances that cause interruptions to business (Correia, 2014, p. 249). Attempts have already been made to limit the obligation to offer assistance and care to air passengers, both in the recent proposal of 2020 to change the Regulation and in the one discussed in 2013. In particular, the proposals for changing the Regulation focused on the establishment of a flat rate for accommodation and the limitation of accommodation provision to a maximum of three (3) nights.

In this regard, it is also essential to observe that it was consistently claimed that assistance for passengers affected by long delays or cancellation was often not provided as envisaged by the Regulation (European Consumer Centres Network, n.d., p. 4). Therefore, it is not clear to what extent the airlines are suffering financial losses due to the implementation of this obligation during Covid-19. Partially, the insufficiency of adequacy and quality, or even absence, of assistance may be the result of: the unclear provisions of Article 9; the absence of the definitions of *snacks*, *meals,* or *refreshments*; or a broad discretion left to the air carrier in the implementation of this Article (European Court of Auditors, 2018, p. 11). Therefore, the proposed changes to the Regulation, clarifying the scope of the obligation to care and assist, are welcome not only in the context of super-extraordinary circumstances but also for the enhancement of air passengers' protection in general.

Since the above-mentioned proposals are not yet accepted, the right to care remains limited only through the application of the principle of proportionality, which, if argued well, may reduce the burden on air carriers. As

mentioned above, the Court has accepted the possible negative consequences of the economic operators who have the obligation to ensure the protection of air passengers (*Denise McDonagh v. Ryanair Ltd,* 2013, para. 48). However, the situation in the *McDonagh* case, although serious enough to deprive different air carriers of part of the fruits of their labour and of their investments, did not threaten their existence nor the stability of international air transportation as a whole. This might shift the axis of the balance in favour of the protection of the interests of air carriers in the assessment of the extent of care to be provided during the pandemic for those awaiting another flight, as well as the amount of compensation to be paid if a passenger was not assisted. However, since the consumer-oriented approach has been constantly followed in recent years by both the legislator and the CJEU (Correia, 2014, p. 249), a significant shift in practice can only be made by changing the Regulation – tackling the present asymmetry via the differentiation of extraordinary circumstances.

5. Conclusions

The majority of epidemics and pandemics, including Covid-19, satisfy the cumulative conditions for characterising their events as extraordinary circumstances established in the case-law of the CJEU, since these events by nature or origin are not inherent in the normal exercise of the activity of air carriers and they go beyond the actual control of that carrier on account of their nature or origin. However, not all of these events may result in exemption from paying compensation to air passengers if the result of such events is the cancellation of a flight. It is necessary to establish the causal link between the extraordinary circumstances and the delay or the cancellation, and to take all reasonable measures to avoid the delay or cancellation or its negative consequences. The same requirements are applicable to Covid-19, since Regulation 261/2004 does not foresee a special group of extraordinary circumstances.

To strike a better balance between the interests of air passengers and air carriers, it is recommended to rethink the concept of extraordinary circumstances and differentiate the extent of the protection afforded to both groups based on the gravity of the situation. The introduction of vouchers as an equal alternative form of reimbursement upon the choice of the carrier in certain circumstances, combined with all the guarantees afforded to this form of reimbursement, may be worth discussing in seeking to strike a better balance between the sustainability of business and the protection of air passengers as a whole. The restriction of the obligation to provide accommodation, limiting it in time and amount considering the relevant circumstances and the principle of proportionality, might not only help to tackle asymmetry between the protection of vital interests in situations such as Covid-19, but also enhance consumer protection, affording more clarity and thus more awareness and willingness on behalf of air carriers to comply with the obligation.

References

A and Others v. Finnair Oyj, Case C-832/18, ECLI:EU:C:2020:204 (CJEU 2020).

Abeyratne, R. (2010). Responsibility and liability aspects of the Icelandic volcanic eruption. *Air & Space Law*, *35*(4/5)*,* 281–377. Retrieved from https://kluwerlawonline.com/journalarticle/Air+and+Space+Law/35.4/AILA2010029

Abeyratne, R. (2012). *Strategic issues in air transport: Legal, economic and technical aspects*. Berlin, Heidelberg: Springer-Verlag. https://doi.org/10.1007/978-3-642-21960-3

Andrejs Eglītis and Edvards Ratnieks v. Latvijas Republikas Ekonomikas ministrija, Case C-294/10, ECLI:EU:C:2011:303 (CJEU 2011).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Balfour, J. (2009). Extraordinary circumstances defence in EC Regulation 261/2004 after Wallentin-Hermann v. Alitalia. *Zeitschrift für Luft- und Weltraumrecht*, *58*, 224–231.

Christopher Sturgeon and Others v. Condor Flugdienst GmbH and Stefan Böck and Cornelia Lepuschitz v. Air France SA, Joint cases C-402/07 and C-432/07, EU:C:2009:716 (CJEU 2009).

Corina van der Lans v. Koninklijke Luchtvaart Maatschappij NV, Case C-257/14, ECLI:EU:C:2015:618 (CJEU 2015).

Correia, V. (2014). Air passengers' rights, extraordinary circumstances, and general principles of EU Law: Some comments after the McDonagh case. *Issues Aviation Law and Policy*, 13(2), 245–278.

Council of the European Union. (2020). Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EC) No 261/2004, establishing common rules on compensation and assistance to passengers in the event of denied boarding and cancellation, or long delay of flights; and Regulation (EC) No 2027/97 on air carrier liability in respect to the carriage of passengers and their baggage by air. Retrieved from https://g8fip1kplyr33r3krz5b97d1-wpengine.netdna-ssl.com/wp-content/uploads/2020/02/SKM_C45820021313150-1.pdf

Croon, J. (2015). 'If you do not know where you are going, you will end up somewhere else': Update on the continuing discussion on technical problems and passenger rights. *Air and Space Law*, *40*(4/5), 331–340. Retrieved from https://kluwerlawonline.com/journalarticle/Air+and+Space+Law/40.4/AILA2015024

Denise McDonagh v. Ryanair Ltd, Case C-12/11, ECLI:EU:C:2013:43 (CJEU 2013).

Dietz, J. E., & Black, D. R. (Eds.). (2012). *Pandemic planning*. Boca Raton: CRC Press. https://doi.org/10.1201/b11779

European Commision. (2013). Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EC) No 261/2004 establishing common rules on compensation and assistance to passengers in the event of denied boarding and of cancellation or long delay of flights and Regulation (EC) No 2027/97 on air carrier liability in respect of the carriage of passengers and their baggage by air. COM/2013/0130 final – 2013/0072(COD). Retrieved from https://eur-lex.europa.eu/legal-content/HR/TXT/?uri=CELEX%3A52013PC0130

European Commission. (2016). Commission Notice. Interpretative Guidelines on Regulation (EC) No 261/2004 of the European Parliament and of the Council establishing common rules on compensation and assistance to passengers in the event of denied boarding and of cancellation or long delay of flights and on Council Regulation (EC) No 2027/97 on air carrier liability in the event of accidents as amended by Regulation (EC) No 889/2002 of the European Parliament and of the Council. *OJ* C 214, 15.6.2016, 5–21. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52016XC0615%2801%29

European Commission. (2020a). Commission Notice. Interpretative Guidelines on EU passenger rights regulations in the context of the developing situation with Covid-19 2020/C 89 I/01. *OJ* C 89I, 18.3.2020, 1–8. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020XC0318%2804%29

European Commission. (2020c). Commission Recommendation (EU) 2020/648 of 13 May 2020 on vouchers offered to passengers and travellers as an alternative to reimbursement for cancelled package travel and transport services in the context of the COVID-19 pandemic C/2020/3125. *OJ* L 151, 14.5.2020, 10–16. ELI: http://data.europa.eu/eli/reco/2020/648/oj

European Consumer Centres Network. (N.d.). Revision of EU air passengers' rights legislation – European Consumer Centres Network position paper [Report]. Retrieved August 22, 2020 from https://www.europe-consommateurs.eu/fileadmin/user_upload/eu-consommateurs/PDFs/PDF_EN/Revision_of_EU_air_passengers_rights_legislation_-_European_Consumer_Centres-Network_position_FINAL.pdf

European Court of Auditors. (2018). *EU passenger rights are comprehensive but passengers still need to fight for them* [Special report No 30, 2018]. Luxembourg: Publications Office of the EU. https://doi.org/10.2865/06411

Felman, A. (2020, March 30). What to know about pandemics. *Medical News Today*. Retrieved from https://www.medicalnewstoday.com/articles/148945

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Friederike Wallentin-Hermann v. Alitalia – Linee Aeree Italiane SpA, Case C-549/07 (CJEU 2008). *European Court Reports* 2008 I-11061.

Germanwings GmbH v. Wolfgang Pauels, C-501/17, EU:C:2019:288 (CJEU 2019).

Graham, M. (2020, May 22). Could COVID-19 make aviation greener? *Cirium*. Retrieved from https://www.cirium.com/thoughtcloud/could-covid-19-make-aviation-greener/

Grennan, D. (2019). What is a pandemic? *JAMA*, *321*(9), 910. https://doi.org/10.1001/jama.2019.0700

Helga Krüsemann and Others v. TUIfly GmbH, Joined Cases C-195/17, C-197/17 to C-203/17, C-226/17, C-228/17, C-254/17, C-274/17, C-275/17, C-278/17 to C-286/17 and C-290/17 to C-292/17, ECLI: EU:C:2018:258 (CJEU 2018).

International Air Transport Association. (2020, May 13). Don't make a slow recovery more difficult with quarantine measures [Press release]. Retrieved from https://www.iata.org/en/pressroom/pr/2020-05-13-03/

International Civil Aviation Organization. (2020, August 26). Effects of Novel Coronavirus (COVID-19) on civil aviation: Economic Impact Analysis [Report]. Retrieved from https://www.icao.int/sustainability/Documents/COVID-19/ICAO_Coronavirus_Econ_Impact.pdf

International Monetary Fund. (2020). *World economic outlook: The great lockdown*. Washington, DC: IMF. Retrieved from https://www.imf.org/en/Publications/WEO/Issues/2020/04/14/weo-april-2020

Jones, B. (2016). United Kingdom and Ireland: Passenger protection turns a corner. In M. Bobek & J. Adams-Prassl (Eds.), *Air passenger rights. Ten years on* (pp. 223–239). Oxford: Hart Publishing.

Marcela Pešková and Jiří Peška v. Travel Service a.s., Case C-394/14, Opinion of Advocate General Bot, ECLI:EU:C:2016:623 (CJEU 2017).

Marcela Pešková and Jiří Peška v. Travel Service a.s., Case C-394/14, ECLI:EU:C:2014:2377 (CJEU 2017).

Parthasarathy, A. (Ed.). (2013). *Textbook of pediatric infectious diseases*. New Delhi: Jaypee Brothers Medical Publishers (P) LTD. https://doi.org/10.5005/jp/books/11900_39

Partington, R., & Partridge, J. (2020, June 10). Airline job losses could be on scale of 1980s mining industry report warns. *The Guardian*. Retrieved from https://www.theguardian.com/business/2020/jun/10/airline-job-losses-could-be-on-scale-of-1980s-mining-industry-report-warns

Pierallini, L. (2013). Regulation 261/2004 – passengers' right to compensation in case of flight delay. Looking for a fair balance of interests. The role of the Court of Justice of the EU and the risk to waste a chance for reform. In P. M. de Leon (Ed.), *From lowlands to high skies: A multilevel jurisdictional approach towards air law* (pp. 117–134). Leiden: Brill, Nijhoff. https://doi.org/10.1163/9789004260641

Prassl, J. (2016). Exceptionally unexceptional: C-257/14 Corina van der Lans v. Koninklijke Luchtvaart Maatschappij NV and the end of Regulation 261/2004's exceptional circumstances defence. *Journal of European Consumer and Market Law*, *5*(3), 136–138.

Regulation (EC) No 261/2004 of the European Parliament and of the Council of 11 February 2004 establishing common rules on compensation and assistance to passengers in the event of denied boarding and of cancellation or long delay of flights, and repealing Regulation (EEC) No 295/91. *OJ* L 46, 17.02.2004, 1–8. ELI: http://data.europa.eu/eli/reg/2004/261/oj

Sandy Siewert and Others v. Condor Flugdienst GmbH, Case C-394/14, ECLI:EU:C:2014:2377 (CJEU 2014).

Sikka, V., Chattu, V. K., Popli, R. K., Galwankar, S. C., Kelkar, D., Sawicki, S. G., Stawicki, S. P., & Papadimos, T. J. (2016). The emergence of Zika virus as a global health security threat: A review and a consensus statement of the INDUSEM Joint Working Group (JWG). *Journal of Global Infectious Diseases*, *8*(1), 3–15. https://doi.org/10.4103/0974-777X.176140

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

United Nations World Tourism Organization. (2020). *COVID-19 – related travel restrictions, a global review for tourism* [2nd report as of 28 April 2020]. Retrieved from https://webunwto.s3.eu-west-1.amazonaws.com/s3fs-public/2020-04/TravelRestrictions%20-%2028%20April.pdf

Van der Wijngaart, T. (2016). Van der Lans v. KLM and extraordinary circumstances. *Air and Space Law*, *41*(1), 59–62.

Von Tigerstrom, B., & Wilson, K. (2020). COVID-19 travel restrictions and the International Health Regulations (2005). *BMJ Global Health*, *5*, e002629. https://doi.org/10.1136/bmjgh-2020-002629

World Health Organization. (2010, February 24). What is a pandemic? Retrieved from https://www.who.int/csr/disease/swineflu/frequently_asked_questions/pandemic/en/

World Health Organization. (2016, March 8). WHO statement on the 2nd meeting of IHR Emergency Committee on Zika virus and observed increase in neurological disorders and neonatal malformations [Statement]. Retrieved from https://www.who.int/en/news-room/detail/08-03-2016-who-statement-on-the-2nd-meeting-of-ihr-emergency-committee-on-zika-virus-and-observed-increase-in-neurological-disorders-and-neonatal-malformations

World Health Organization. (2020a). *COVID 19: Public Health Emergency of International Concern (PHEIC). Global research and innovation forum: towards a research roadmap*. Retrieved from https://www.who.int/publications/m/item/covid-19-public-health-emergency-of-international-concern-(pheic)-global-research-and-innovation-forum

World Health Organization. (2020b, February 29). Updated WHO recommendations for international traffic in relation to COVID-19 outbreak. Retrieved from https://www.who.int/news-room/articles-detail/updated-who-recommendations-for-international-traffic-in-relation-to-covid-19-outbreak

World Health Organization. (2020c, March 11). WHO Director-General's opening remarks at the media briefing on COVID-19. Retrieved from https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020

Worldometer. (2020). Countries where COVID-19 has spread. Retrieved 22 August 2020, from https://www.worldometers.info/coronavirus/countries-where-coronavirus-has-spread/

Regina VALUTYTE is the professor of international and European human rights and aviation law at the School of Law, Mykolas Romeris University, Lithuania. She is the head of the Security Research Laboratory and active expert in numerous international projects. Research interests: human rights, aviation law, privacy.
ORCID ID: https://orcid.org/0000-0001-9777-2784

FINANCIAL SECTOR ASSETS, REAL INNOVATION AND ECONOMIC GROWTH: ASSESSMENT OF INTERCONNECTION AND INFLUENCE OF REGULATORY INSTRUMENTS[*]

Gaukhar Kalkabayeva [1], Aibota Rakhmetova [2], Gulmira Nakipova [3], Roza Bespayeva [4], Ziyada Borbasova [5], Yuliya Saifullina [6]

[1,2,3,4,,5,6] Karaganda Economic University of Kazpotrebsoyuz, Akademicheskaya 9 street, Karaganda, Kazakhstan

E-mails: [1] aisanatazhbaeva@mail.ru ; [2] aibota@mail.ru ; [3] genakipova@mail.ru ; [4] brs_@mail.ru ; [5] borbasova@mail.ru ; [6] ulia_alex@mail.ru

Abstract. The authors raise the actual problem of weak intersectoral interaction of subjects of the financial-credit and innovation sectors of Kazakhstan. Currently, asymmetric processes are observed not only in the interaction of two strategically important sectors for the economy, but also in the asymmetric nature of the impact of regulatory instruments on the process of their interaction. This is a consequence of a largely non-integrated and disproportionate government policy, which in recent years has been characterized by one-sidedness and narrow focus in stimulating and supporting certain sectors and industries. In this regard, the authors carried out a three-level assessment of dependencies to determine the degree of influence of innovation activity on the rate of economic growth, the degree of influence of financial-credit organizations on the results of innovation activity and the degree of influence of the current regulatory instruments on the investment activity of the financial sector. As a result of the construction and use of an econometric model, results were obtained that confirm the hypothesis formulated by the authors about the creative role of systemic regulation, but also reveal the existing potential and points of convergence of financial-credit organizations with the innovative sector of the economy.

Keywords: financial and credit organizations; innovation sector; intersectoral interaction; regulatory institutions

1. Introduction

In modern conditions of global geopolitical changes, volatility in the commodity and financial markets, frequent cyclical fluctuations and the rapid growth of integration processes, the issues of ensuring sustainable development of the national economy by deepening the diversification of its structure and increasing competitiveness in the field of innovations in the real sector of the economy come to the fore. These issues are especially relevant for Kazakhstan with a slowdown in economic growth and continued dependence of the economy on the income of the oil and gas sector. The existing practice in the country of relations between the financial and innovation sectors of the economy shows that even with the presence of potentially successful ideas, the desire to financially support these projects is reduced to almost zero due to the low risk appetite of financial and credit institutions and the tightening requirements of the financial regulator. The emerging trends, the presence of unsolved problems and at the same time the accumulated potential of private financial and credit organizations in Kazakhstan emphasize the ambiguity and relevance of this study, the need for a critical rethinking of the process of regulation the activities of financial and credit organizations for more effective interaction with innovative enterprises in the new conditions of the development of the world economy.

2. Theoretical background

Currently, the role of state regulation as a direction in resolving these problems is growing. Many scientists and experts are of the opinion that the solution of the complex task of reorienting investments in the sphere of expanded reproduction and modernization of fixed assets in the real sector is impossible without embedding incentives in the process of macro regulation. Moreover, the experience of a number of countries in America, Asia and Europe (period 1997-2010) testifies to the productivity of this regulatory paradigm (Pradhan, Arvin, Nair, Bennett, 2020). Overcoming the increased appetites of monopolies and financial and credit structures, reorienting them to meet the financial needs of the real sector, will possible only with government support and stimulation of structural and technological restructuring of the economy by stimulating innovation (Rakhmetova, 2015)

The analysis of problems about the relation between the financial and innovative sectors of the economy' study indicates that there is a link between indicators of the development of the financial sector, real innovation and economic growth (Majeed, Iftikhar, Atiq, 2019). Some studies are devoted to the interaction of various factors (Niyazbekova, Grekov, Blokhina, 2016). For example, a study of 6,422 enterprises in 22 emerging economies found that lack of an access to credit resources hinders innovation. This statement is particularly true for firms that are limited in alternative sources of financing (Qi, Ongena, 2020). Studies of Spatareanu M., Manole V., Kabiri A. emphasize the importance of bank financing for the innovative activities of British firms. The authors found out the problems of stability of banks during the crisis of 2008 and 2011 affected the innovative development of companies negatively (Spatareanu, Manole, Kabiri, 2019). In the study of Khan MK., Kaleem A., Zulfigar S., Akram U. the relation between the various sources of financing used by Chinese firms and the intensity of their research and development were analyzed. The choice of funding source for research and development depends on financial constraints (Khan, Kaleem, Zulfigar, Akram, 2019).

Wang HZ., Yin DS., Zhang XTTN., Zhen XT. applied regression analysis to investigate universal banks as an important source of external financing and their impact on the results of innovative activity of borrowing firms. The authors also explore other sources of funding for innovation in firms (Wang, Yin, Zhang, Zhen, 2019). A study of the use of bank credit lines to finance research and development investments based on the data of 939 firms from 17 European countries was conducted by a group of researchers Guney Y., Karpuz A., Ozkan N. The results of the study showed that provided credit lines had a positive and significant impact on investment in

research and development (Guney, Karpuz, Ozkan, 2017). Kim S., Lee H., Kim J. investigate the various effects of external financing (bank loans, equity and bond issues) on the technological innovation activities of Korean listed companies. They found that indirect external financing through bank loans affected the technological innovation activities of Korean firms negatively, while direct external financing through the issuance of securities had a positive impact (Kim, Lee, Kim, 2016).

A significant part of the research was conducted on the basis of panel and time series data using standard regression equations, including the introduction of various significant variables (factors that are significant for the result). Researchers Diamond D, Weinrich G., Kaas L. in their work used a model of dependence between the indicator of economic growth and the endogeneity of behavioral strategies of banking system subjects (Kaas, 2018). As a basis, scientists had taken such types of assets as money supply and securities (corporate shares and government bonds). Evidence of growth of the money supply that leads to a decrease in the yield on government securities, and to an increase in the yield on corporate shares had been uncovered. In turn, the direction of bank investments in corporate stocks encourages economic growth.

The endogenous growth model reveals a non linear relationship between the rate of economic growth and the performance of the banking sector by Dieda L., Fatya B. In particular, scientists have identified a contradictory impact of the activities of banking sector entities on the economy: positive – increasing trends in the division of labor and specialization, and negative - competition between banking sector entities and increased speculation in the stock market (Deidda, 2002). Authors Hung F. and Kosren R. we applied a non-linear model of endogenous growth and identified the impact of bank credit operations on economic growth through innovation financing. As in previous models, the ambiguous impact of the credit mechanism on economic growth is shown here (Hung, 2012).

We believe that the fundamental basis for the prevention of emerging contradictions in the context of intersectoral interaction between the financial-credit and innovation sectors of the economy is the adjustment of the vector of the current system of state regulation. In this regard, the central hypothesis of this study is to identify the role of state systemic regulation on the nature and quality of interaction between the financial-credit and innovation sectors, and, as a consequence, on economic growth. Our hypothesis, in context of a systems approach, allows us to formulate the following questions: 1) What is the impact of innovation in the real sector on the rate of economic growth? 2) What is the impact of various sources of investment financing on the growth of innovation? 3) What is the role of the assets of financial-credit organizations in financing real innovations? 4) What is the degree of influence of government regulation instruments on the activities of financial-credit organizations, on the intensity and trajectory of intersectoral interaction? – which we check using correlation-regression analysis.

3. Research objective and methodology

To confirm our hypothesis about the role of regulatory measures on the interaction of financial-credit and innovation sectors, within the framework of this scientific study an economic and mathematical model was developed. The novelty of the research is the application of an integrated approach to the construction of an economic and mathematical model based on the identification of a causal relationship at three levels: the first level – the impact of the results of innovative activities on economic growth; the second level is the influence of financial assets on the growth of the innovation sector and the third level – the influence of regulatory instruments on the investment activity of financial and credit institutions (Figure 1).
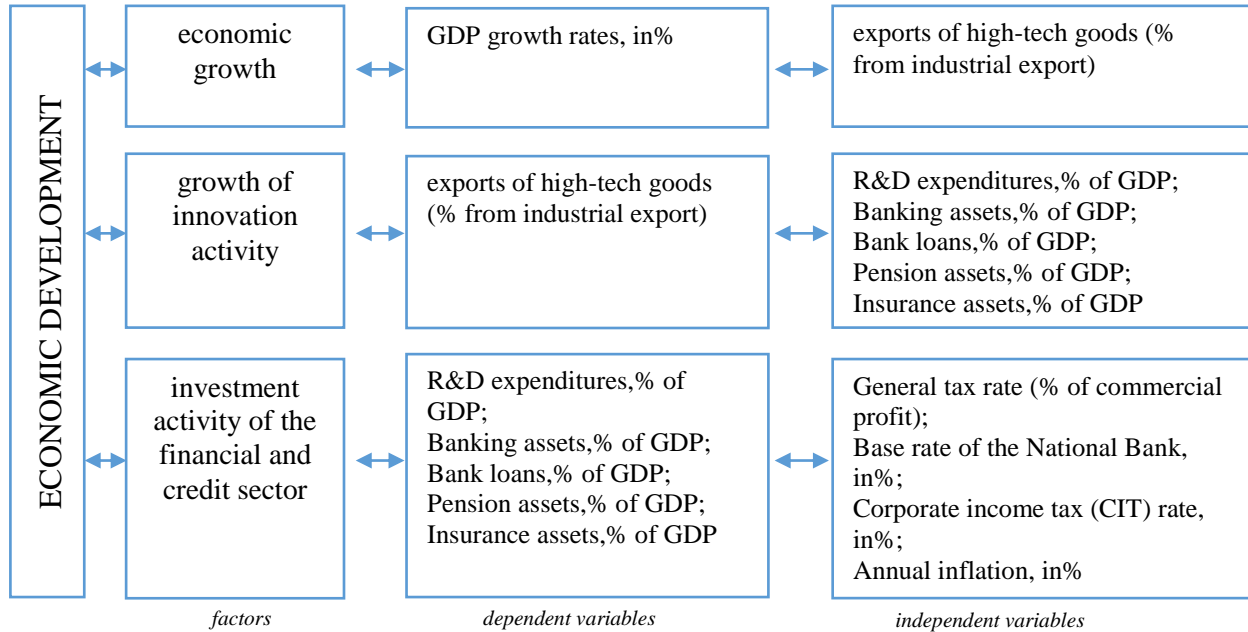
Figure 1. Logic and structure of the conducted econometric research

Source: compiled by the authors

For empirical data analysis, we applied econometric modeling methods, in particular corrrellation-regression analysis with the construction of paired and multiple linear regression models. The choice of corrrellation-regression model is due to the fact that it is this model that allows us to confirm our hypothesis and answer the formulated questions as much as possible. The PPP Stata 13 was used as a modeling tool and graphical illustration of dependencies was performed in Excel. The statistics were taken from World Bank's international database (www.worldbank.data.org) and databases of the National Bank of the Republic of Kazakhstan for the last 25 years from 1993 to 2017 (www.nationalbank.kz). It should be noted that the research limitations in the modeling being carried out were certain indicators, the values of which were not available due to their absence in the statistical databases we used (such as reserve rates in the context of financial-credit organizations, the share of medium-term loans issued to enterprises of the innovation sector, the share of pension and insurance assets invested in securities of enterprises of the innovation sector, etc.)

4. Results and discussion

1. To assess the first group of relationships (the impact of innovation results on economic growth), we used an indicator reflecting economic growth – GDP growth rates (gross domestic product) in % per year and an indicator of innovation performance – exports of high-tech goods, as a % of industrial exports. The dependent variable was the GDP growth rate (% per year) for the study period. The indicator of exports of high-tech goods (in % of industrial exports) was used as an independent variable. The correlation analysis showed a weak causal relationship between these variables, since the correlation coefficient between GDP growth rates and exports of high-tech goods was equal *to r* = 0.18 (Figure 2).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Figure 2. Diagram of dependence between GDP growth rates and the results of innovation activity in the Republic of Kazakhstan

Source: compiled by the authors

The regression equation has the following form:

$$GDP = 2,1782 + 0,0925 Inn$$
$$(2,27) \quad (0,11)$$

where:
GDP - GDP growth rate (% per year),
Inn - exports of high-tech goods (% from industrial export).

Obtained results show that exports of high-tech goods in Kazakhstan do not affect the GDP growth rate in this period significantly, which confirms the thesis that economic development in Kazakhstan is still determined by the historically established structure of the economy, the development of which is mainly due to income from raw materials exports and investment growth in traditional sectors of the extractive sector. At the same time, recent trends in the development of the global economy, which are mainly characterized by frequent cyclical fluctuations and geopolitical changes in the world, require deeper diversification and effective structural adjustment in Kazakhstan strongly. However, in countries with more diversified economies and less dependence on mineral exports, on the contrary, there is a correlation in the first group of indicators (table 1). In particular, the countries with the largest innovation component that affects GDP growth rates include the United States (0.089,/0.15), Sweden (0.198/0.11), (United Kingdom (0.173/0.26).

Table 1. Models of dependence of GDP growth rates on exports of high-tech goods in cross-country context

Country	Constant	Regression coefficient	R^2
United States	0.279 (1.153)	0.089* (0.044)	0.15
Sweden	- 0.237 (1.848)	0.198 (0.117)	0.11
United Kingdom	- 2.119 (1.515)	0.173*** (0.059)	0.26

Note: Standard errors are shown in parentheses: * denotes significance at the 10 percent level;
* * denotes visibility at the 5 percent level; * * * denotes significance at the 1 percent level.

Source: compiled by the authors

2.   Within the framework of modeling indicators for the second group of dependencies (the impact of financial assets on the growth of the innovation sector), we have made an attempt to determine the degree of the greatest impact of various sources of innovation financing on the growth of the innovation sector. In this regard, we have grouped all existing relevant factors that can influence the growth of innovation in domestic conditions into appropriate groups, in order to assess the degree of correlation with the performance indicator of the innovation sector for each group (table 2).

Table 2. Grouping of sources of innovation financing indicators

Investment	Bank loans	Assets	Stock market
1 group	2 group	3 group	4 group
R & d expenditures (I_1, % of GDP)	Domestic credit to the private sector by banks (C_1, % of GDP)	Banking assets (A_1, % of GDP)	Market capitalization of listed domestic companies (F_1, % of GDP)
Fixed capital investment (I_2, % compared to the previous year)	Long-term bank loans to legal entities (C_2, % of GDP)	Pension assets (A_{A2}, % of GDP)	Shares outstanding, total value (F_2, % of GDP)
Foreign direct investment (I_3, % compared to the previous year)	Short-term loans of second-tier banks (C_3, % of GDP)	Assets of insurance companies (A_3, % of GDP)	

Source: compiled by the authors

The sources of statistical data for this group of dependencies were statistical indicators from the World Bank database (www.worldbank.data.org), National Bank of the Republic of Kazakhstan (www.nationalbank.kz) and the Committee on statistics of the Ministry of National economy of the Republic of Kazakhstan (economy.gov.kz) for the period from 1995 to 2018. The obtained data was previously systematized and grouped. The choice of the indicator "export of high-tech goods in the total volume of industrial exports" is justified by the fact that the practice of determining key indicators in the development of the innovation sector of Kazakhstan and economically developed foreign countries differs significantly. Thus, the main indicators in the field of innovation development, which are calculated by domestic statistical agencies, are mainly quantitative data (number of patents, the number and share of innovative-active enterprises, the number of enterprises, the share of research and development expenditures implementing high-tech innovations, etc.) in Kazakhstan, but the methodology of World Bank uses as a key indicator in the field of innovation development an indicator, that reflects, in our opinion, the final result of innovative entities – "the share of high-tech products in the total volume of industrial exports», which we took as a dependent variable. For each group of factors, a correlation analysis of the relationship with the indicator of exports of high-tech goods in the Republic of Kazakhstan (*Inn*, % of industrial exports) was conducted and a corresponding regression model was developed.

The regression equation in this case has the following type:

$$Inn = 78{,}88 + 78{,}33 \cdot I_1 - 0{,}22 \cdot I_2 - 0{,}14 \cdot I_3$$
$$\quad (10{,}9) \quad (29{,}6) \qquad (0{,}05) \qquad (0{,}07)'$$

In particular, the results of analysis of the first group of factors ("investment») also have shown that there is a feedback link between exports of high-tech goods in Kazakhstan and expenditures on research and development (R & d) ($r_{Inn,I_1} = -0{,}52$). The obtained result confirms the thesis that the quantitative growth of innovation

activity indicators, including the growth of research and development expenditures, do not provide a guaranteed impact on the quality of work of subjects of the innovation sector in the Republic of Kazakhstan and, above all, on the results of their activities. In this case, we should note the weakness of the institutional infrastructure represented in Kazakhstan by a network of specially created development institutions (JSC "National Agency for technological development" (LLC «Natr»), JSC "Development Bank of Kazakhstan", JCS "QazTech Ventures", Kazakh Export, Kazakhstan project preparation Fund, etc.) which are aimed at stimulating the growth of the national economy at the expense of public funds. However, the activities of these organizations on the background of realization of strategy of industrial-innovative development, in our view, without full competition from private financial-credit institutions, as it can be seen from the obtained results, work only for the execution of mainly quantitative indicators (The concept of development of financial sector of Kazakhstan until 2030, State program of industrial and innovative development of the Republic of Kazakhstan for the period 2015 -2019). Moreover, both investments in fixed assets and direct foreign investments do not show a positive effect on the resulting indicator ($r_{Inn,I_2} = -0.53$; $r_{Inn,I_2} = -0.48$) (Figure 3).
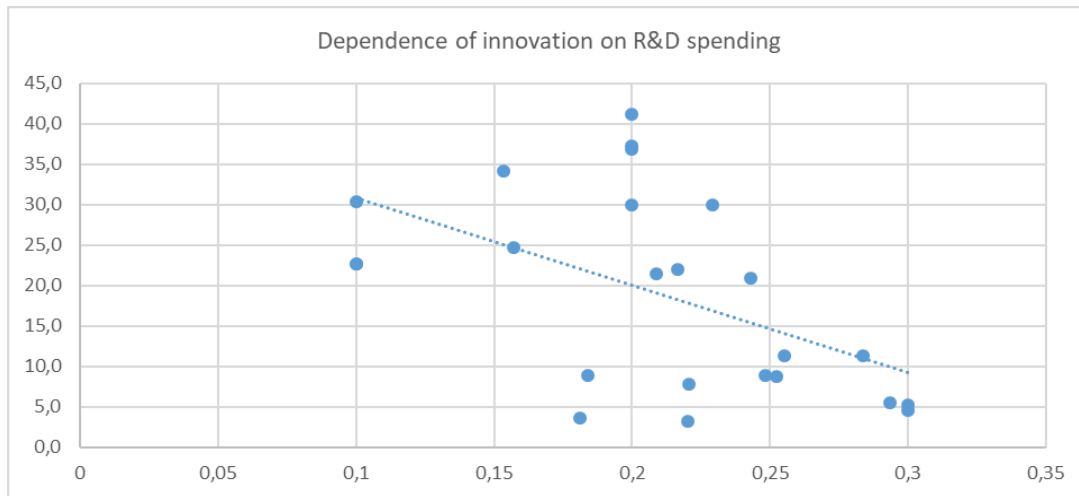
Figure 3

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

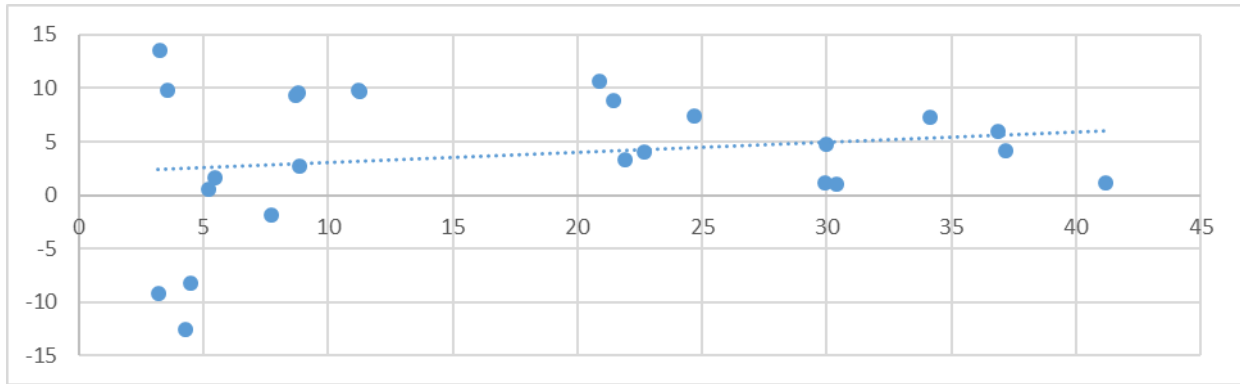**Figure 3.** Diagram of the dependence of innovation performance on a number of indicators: research and development expenditures, foreign investment and investment in fixed assets in the Republic of Kazakhstan

Source: compiled by the authors

This result is not accidental, it confirms the choice of Kazakhstan's industrial sector enterprises, of the so-called, "catch-up development" model according to which the owners of enterprises (both domestic and foreign investors) do not invest resources in innovative development, but purchase ready – made high-tech equipment in partner countries in order to level the time factor. The use of ready-made foreign equipment and technologies is evidenced by the activities of such industrial companies as: JSC "Arcelor Mittal Temirtau", LLP "Corporation Kazakhmys», «Tengizchevroil","Karachaganak Petroleum", and others that work in the extractive sector [18].

Assessment of the impact of factors of the second group ("Bank loans») showed the strongest correlation with the export of high-tech goods indicators of domestic lending to the private sector and long-term bank lending to legal entities, since the pair correlation coefficients have values $r_{Inn,C_1} = 0.62$; $r_{Inn,C_2} = 0.65$. At the same time, short-term loans from second-tier banks do not have a positive impact on the development of innovations, since поскольку $r_{Inn,C_3} = -0.06$. This can be explained by the fact that the terms of short-term lending and the conditions for its provision do not coincide with the duration of the full innovation cycle.

Taking into account the fact that the indicators of domestic lending to the private sector and long-term lending to legal entities are very closely interrelated, it is advisable to evaluate separate models:

$$Inn = 5.43 + 0.49 \cdot C_1$$
$$\quad (4.61) \ (0.14)$$

and

$$Inn = 16.0 + 1.8 \cdot C_2 - 3.03 \cdot C_3$$
$$\quad (3.86) \ (0.25) \quad (0.65)$$

All regression coefficients are statistically significant. At the same time, with an increase in the share of domestic loans to the private sector in GDP by 1%, the share of exports of high-tech goods in industrial exports will grow by 0.49%. Similarly, an increase in the share of long-term bank loans to legal entities in GDP by 1% will contribute to an increase in the share of exports by 1.8%. While an increase in the share of short-term bank loans in GDP by 1% leads to a decrease in the share of exports by 3.03% (Figure 4).
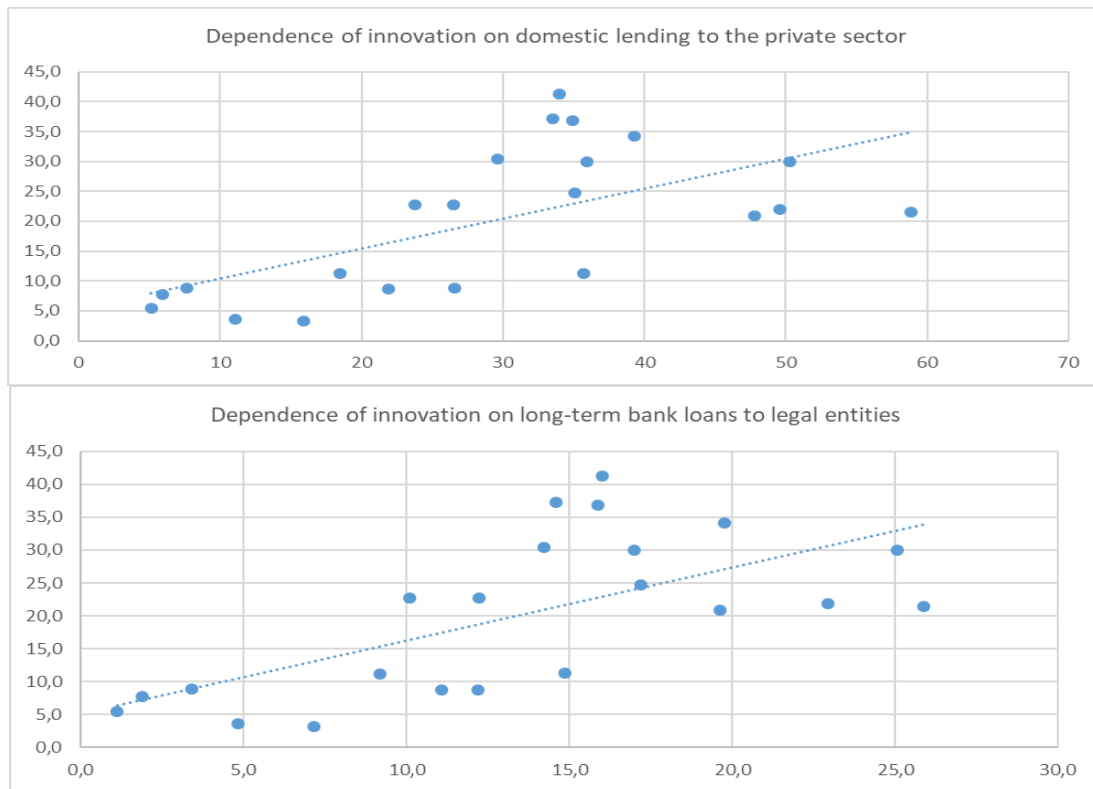
Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
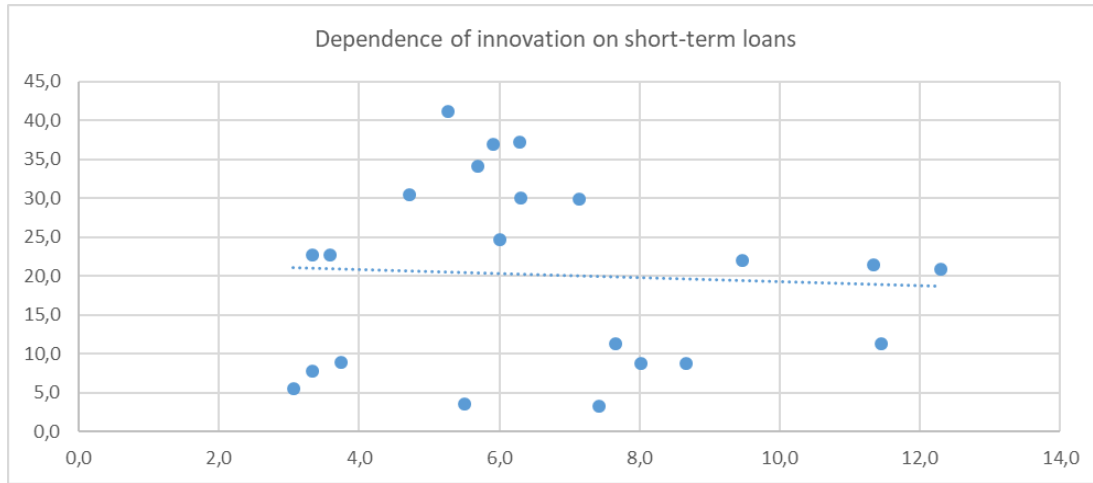
Figure 4. Diagram of the dependence of the results of innovation activity and indicators of bank lending, including the context of credit terms in the Republic of Kazakhstan

Source: compiled by the authors

The evaluation of the influence factors of the third group ("assets") for the performance indicator of innovative activity (high-technology exports in total industrial exports) in the Republic of Kazakhstan to the greatest extent on the resulting sign is influenced by the assets of insurance companies ($r_{InnA_3} = 0.79$) and to least extent – pension assets ($r_{InnA_2} = 0.56$). Total bank assets have a weak impact on the result ($r_{Inn\& a_1} = 0.11$). The regression model has the following type:

$$Inn = 20.85 + 0.33 \times A_1 + 1.89 \times A_2 + 29.4 \times A_3$$
$$(8.89) \quad (0.12) \qquad (0.97) \qquad (6.02)$$

Thus, with an increase in the share of banking assets in GDP by 1%, we can expect an increase in the share of exports of high-tech goods in industrial exports by 0.33%. In turn, if the share of pension assets increases by 1%, the share of exports of high-tech goods will increase by 1.89%. An increase in the share of assets of insurance companies will contribute to the growth of exports of high-tech goods by 29.4% of industrial exports (Figure 5).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Figure 4. Diagram of the dependence of the results of innovation activities and various types of financial assets in the Republic of Kazakhstan

Source: compiled by the authors

Thus, despite the still insufficient role of insurance sector entities in the development of the domestic economy (no more than 1 trillion tenge or 1.8% of GDP), insurance sector entities, due to the concentration of long-term resources, have a great potential to interact with the subjects of the innovation sector (Kalkabayeva, Kurmanalina, Gusmanova, 2017). The term of placement of long-term insurance resources coincides with the duration of the innovation process (on average 7-10 years). This confirms the prospects of using insurance savings in the interests of economic development, as it happens in economically developed countries. Thus, the share of insurance resources in the structure of venture business financing in the European Union has reached 15% (www.ec.europa.eu/eurostat). At the same time, pension assets play an even greater role in the development of innovations here, their share in the structure of venture business financing has reached 25%, exceeding the share of investment by the banking sector in the development of innovations. Of course, the similar nature of the formation of insurance and pension resources, as well as successful international practice, indicate the prospects for their use. The inconsistency of the result obtained for pension assets indicates the imperfection of regulatory institutions of financial organizations in terms of their interaction with subjects of the innovation sector, and the current practice of strict regulation, as well as in relation to subjects of the banking sector, which reduces their role in the development of the domestic innovation sector (Rakhmetova, Kalkabayeva, Iskakova, Kurmanalina, Turmakhanbetova, 2019).

Studing the degree of influence of factors of the fourth group ("stock market»), which characterize trends in the development of the stock market in Kazakhstan, it is necessary to highlight the indicators "market capitalization of listed domestic companies" and " value of shares in circulation». However, the obtained results showed that these indicators do not affect the indicator "export of high-tech goods» significantly. The coefficients of paired correlation coefficients between these indicators are $r_{InnF_1} = 0.005$ and $r_{InnF_2} = -0.19$ respectively. The same result is given by a regression analysis of the dependence of innovations on the stock market indicators:

$$Inn = 24,5 + 0,13 \cdot F_1 - 1,44 \cdot F_2$$
$$(4,78) \quad (0,25) \quad \quad (1,59)$$

3.   To assess the third group of relationships (the impact of regulatory instruments on the investment activity of financial and credit sector entities), we set the task of assessing the degree of influence of regulatory instruments on key indicators of the main sectors of the financial market. In particular, the results of regression analysis presented in table 3 show that the regression equation in terms of the impact of regulatory instruments on the dynamics of bank lending is statistically significant. The 75% variation in loans to the private sector is explained by changes in the factors included in the model. All coefficients of the equation, except the coefficient before the "total tax rate" indicator, are statistically significant.

Interpretation of regression coefficients, all other things being equal, gives the following results: - with an increase in the refinancing rate by 1%, we can expect a decrease in bank loans to the private sector in GDP by 0.41%; - with an increase in the CIT rate by 1%, the share of bank loans to the private sector in GDP will decrease by 2.4%; - if the inflation rate rises by 1%, the share of bank loans to the private sector in GDP will increase by 0.85%.

Table 3. Model of dependence between bank loans to the private sector and regulatory instruments in the Republic of Kazakhstan

Dependent variable: Domestic credit to the private sector by banks (% of GDP)	
MNC	
Total tax rate (% of commercial profit)	-0.015 (0.508)
Refinancing rate/ now base rate of National Bank of the Republic of Kazakhstan, %	-0.406* (0.202)
CIT rate, %	-2.365*** (0.701)
Annual inflation, %	0.847* (0.469)
Constant	81.689*** (10.754)
The sample size, n	24
R^2	of 0.75

Note: Standard errors are shown in parentheses: * denotes significance at the 10 percent level; * * denotes significance at the 5 percent level; * * * denotes significance at the 1 percent level.

Source: compiled by the authors

Model building of assets of the insurance sector dependence and regulatory instruments (table 4) allowed us to obtain the following results:

Table 4. Model of insurance sector assets dependence on regulatory instruments in the Republic of Kazakhstan

Dependent variable: insurance sector Assets (% of GDP)	
MNC	
share of securities in the investment portfolio of the insurance sector, %	-0.009 (0.009)
Standard of diversification of assets of the insurance sector invested in non-government securities of the Issuer of the Republic of Kazakhstan, billion tenge	3.957** (1.629)
share of bank deposits in the insurance sector's investment portfolio, %	0.023 (0.014)
Standard of diversification of assets of the insurance sector invested in deposits of one bank, billion tenge	2.574** (0.921)
Total tax rate (% of commercial profit)	-0.055*** (0.0104)
Annual inflation, %	0.052*** (0.014)
Constant	1.189 (0.866)
The sample size, n	16
R^2	of 0.95

Note: Standard errors are shown in parentheses: * denotes significance at the 10 percent level; ** denotes significance at the 5 percent level; * * * denotes significance at the 1 percent level.

Source: compiled by the authors

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

- in general, the regression equation is statistically significant. The 95% variation in the resulting indicator, namely, insurance sector assets, is explained by the regressors included in the model;

- insignificant coefficients are the coefficients of the equation for the variables "share of securities" and "specific weight of bank deposits in the investment portfolio of the insurance sector». The remaining coefficients are statistically significant with a probability of 95%;

- with an increase in the insurance sector's asset diversification ratios invested in non-government securities and in deposits of one Bank by 1%, the insurance sector's assets in GDP will increase by 3.96 and 2.57 %, respectively;

- if the total tax rate increases by 1%, the assets of the insurance sector will decrease by 0.06%. At the same time, gross inflation, on the contrary, will contribute to an increase in assets of the insurance sector by 0.05%.

Table 5. Model of pension sector assets dependencies and regulatory instruments in the Republic of Kazakhstan

Dependent variable: pension sector assets (% of GDP)	
MNC	
Share of non-governmental securities of Kazakhstan issuers in the investment portfolio of the pension sector, %	-0.021 (0.048)
Limits of investment of pension assets in non-government securities of organizations of the Republic of Kazakhstan, except for second-tier banks of the Republic of Kazakhstan, %	-33,743*** (9,415)
Share of bank deposits in the pension sector's investment portfolio, %	-0.045 (0.082)
Limits on investment of pension assets in deposits and financial instruments of second-tier banks in Kazakhstan, %	-29,236** (12,771)
Total tax rate (% of commercial profit)	-0,142** (0,064)
Annual inflation, %	0,032 (is 0.102)
Constant	37.918*** (7,625)
The sample size, n	16
R^2	of 0.91

Note: Standard errors are shown in parentheses: * denotes significance at the 10 percent level; * * denotes significance at the 5 percent level; * * * denotes significance at the 1 percent level.

Source: compiled by the authors

Modeling the dependence of pension sector assets on regulatory instruments (table 5) led to the following conclusions:

- the 91% change in pension sector assets is explained by changes in regulatory instruments. The regression equation is statistically significant;

- insignificant for our data were "the share of non-state securities issued by issuers" and "the share of second-tier banks deposits in the pension sector's investment portfolio», as well as the "annual inflation rate ".

- statistically significant instruments based on the sample data under study are: the "investment limits of pension assets in non-government securities of organizations and in deposits and financial instruments of second-tier banks" and "total tax rate";

- if the investment limits of pension assets in non-government securities, as well as in second-tier banks deposits and financial instruments increase by 1%, the share of pension sector assets will decrease by 33.7 and 29.2, respectively;

- with an increase in the tax rate by 1%, pension assets are expected to decrease by 0.14% .

5. Discussion

The obtained results by applying an economic and mathematical model allowed us to formulate the main conclusions in the context of this scientific study:

The absence of dependence between the results of innovation activity in Kazakhstan and the dynamics of GDP growth was revealed against the background of such dependence in economically developed countries, which occupy leading positions in the global innovation index, which confirmed the thesis about using "catch - up development" model, and the main factor of economic development is still the income of the extractive sector.
There is an inverse relationship between research and development expenditures and innovation results, which indicates the ineffectiveness of specially created quasi-public sector development institutions that work primarily on the implementationof quantitative indicators.

It was confirmed that investments in fixed assets and foreign investment also do not significantly affect the results of innovation activities, which indicates the direction of investment flows mainly in branch, technology and equipment of the extractive sector.

Significant potential impact of bank loans on the results of innovation activity has been confirmed, first of all, long-term bank loans, the timing of which corresponds to the duration of the competitive innovation cycle, which determines the prospects for their use in contrast to short-term loans, for which such a dependence is not observed.

There is a strong correlation between the assets of insurance companies and the results of innovation activity, which indicates the existing potential of the insurance sector, including pension assets; the effective use of long-term assets of the insurance sector in favor of subjects of the innovation sector is successfully confirmed by world practice.

As expected, the instruments of the securities market did not show an impact on the results of innovation activity due to the least developed structure of the financial market and the lack of practice of using securities by real entities (including the innovation sector).

It is shown that there is no strong dependence of the activity of financial market entities on the inflation indicator, which should become the basis for eliminating distortions in the implementation of the monetary policy of the regulator, which aggravates and preserves problematic nodes in the interaction of the financial and credit and innovation sectors of the economy.

The results confirming the influence of state regulatory instruments on the activity of banking sector entities, in which refinancing rate and corporate interest rate had the greatest correlation, are presented. It is the state, as the regulatory bodies is actively involved in the implementation of integrated economic policy, that, as world practice shows, is subject to adjust and stimulate the activities of commercial banks so that they are more actively involved in the innovation sector.

The results confirming the influence of instruments of state regulation of activity of subjects of insurance sector, the structure of which has the greatest correlation show the set standards for diversification of assets of the insurance sector and tax burden, which speaks about the potential impact of regulatory options on business entities of the insurance sector (including pension fund) with the aim of enhancing their interaction with actors of the innovation sector. The injection of resources of insurance and pension funds, which has a long-term investment character corresponding to the duration of the full innovation process, is blocked by the rather strict regulatory practice of the financial regulator. We believe that the current practice of placing these funds in highly liquid securities of foreign banks and companies should be focused on investing resources primarily in domestic economy (the experience of Norway and other European countries) taking into account the establishment of an appropriate anti-corruption mechanism and the development of a mechanism for repayment and efficient utilization of these resources in the manufacturing and innovation sectors of Kazakhstan.

The authors point out the asymmetry in the work of the public system of regulation of intersectoral interaction, which is confirmed by the weak institutional infrastructure, centralized innovation policy in the country's industries and regions against the background of the long-term implementation of the state program of industrial and innovative development.

6. Conclusion

Thus, the pronounced processes of globalization and trends in financial and economic turbulence today have exacerbated issues related to ensuring the sustainable development of national economic systems, including on the basis of harmonious intersectoral interaction of various economic entities. This study attempts to model country panel data in order to prove the significant impact of the regulatory system on the intensity and quality of interaction between two strategic sectors for any economy – financial-credit and real (including innovative) sectors of the economy against the background of a strong correlation between the rates of economic growth and the innovation component.

Among other things the ability of the process of interaction between financial and real (including innovative) sectors of the economy simultaneously generate the effects (expected results at different levels) as a result of system element determines the conduct of cross-national comparative analysis of the role of interaction of economic sectors to determine their current and future positioning. The results of the analysis showed that Kazakhstan's lag behind a number of developed countries was caused by various institutional conditions affecting the potential and capabilities of interacting sectors.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

References

Rakhmetova, A. (2015)a. The concept of interaction between the banking and real sectors of the economy in modern conditions: dissertation for the degree of doctor of economic sciences in the specialty 08.00.10.   M., 370 p.

Rakhmetova, A. (2015)b. Modern trends in interaction between the banking and real sectors of the economy: the experience of Russia and Kazakhstan. M.: KNORUS, 323 p.

Pradhan, RP., Arvin, MB., Nair, M., Bennett, SE. (2020). Sustainable Economic Growth in the European Union: The Role of ICT, Venture Capital and Innovation. *Review of Financial Economics*, 38(1), 34-62. https://doi.org/10.1002/rfe.1064

Majeed, S., Iftikhar, SF., Atiq, Z. (2019). Modeling the Impact of Banking Sector Credit on Growth Performance: An Empirical Evidence of Credit to Household and Enterprise in Pakistan. *International Journal of Financial Engineering*, 6(2). https://doi.org/10.1142/S2424786319500129

Niyazbekova, Sh.U., Grekov, I.E., Blokhina, T.K. (2016). The influence of macroeconomic factors to the dynamics of stock exchange in the Republic of Kazakhstan. *Economy of Region*, 12(4). 1263-1273. http://doi.org/10.17059/2016-4-26

Qi, SS., Ongena, S. (2020). Fuel the Engine: Bank Credit and Firm Innovation. *Journal of Financial Services Research*, 57(2), 115-147. https://doi.org/10.1007/s10693-019-00316-6

Spatareanu, M., Manole, V., Kabiri, A. (2019). Do bank liquidity shocks hamper firms' innovation? *International Journal of Industrial Organization*, 67. https://doi.org/10.1016/j.ijindorg.2019.06.002

Khan, MK., Kaleem, A., Zulfigar, S., Akram, U. (2019). Innovation Investment: behavior of Chinese Firms towards Financing Sources. *International Journal of Innovation Management*, 23(7). https://doi.org/10.1142/S1363919619500701

Wang, HZ., Yin, DS., Zhang, XTTN., Zhen, XT. (2019). Whom you borrow from matters: universal banks and firm innovation. *Managerial Finance*, 45(8), 1001-1019. https://doi.org/10.1108/MF-06-2018-0263

Guney, Y., Karpuz, A., Ozkan, N. (2017). R&D Investments and Credit Lines. *Journal of Corporate Finance*, 46, 261-283. https://doi.org/10.1016/j.corpfin.2017.07.011

Kim, S., Lee, H., Kim, J. (2016). Divergent Effects of External Financing on Technology innovation activity: Korean evidence. *Technological Forecasting and Social Change*, 106, 22-30. https://doi.org/10.1016/j.techfore.2016.02.002

Kaas, L. (2018). Money and Growth in a Production Economy with Multiple Assets. *Macroeconomic Dynamics*, 7, 670 – 690.

Deidda, L. (2002). Non-linearity between Finance and Growth. *Economics Letters*, 74(3), 339 –345.

Hung, Fu-Sheng. (2012). Credit Market Development and Economic Growth. *Journal of Economics and Business*, 54(2), 219 –237.

Official site of World Bank. http://www.worldbank.org

Official web site of the National Bank of the Republic of Kazakhstan. http://www.nationalbank.kz

The concept of development of financial sector of Kazakhstan until 2030. http://kba.kz

State program of industrial and innovative development of the Republic of Kazakhstan for the period 2015 -2019. http://www.mid.gov.kz

Business roadmap 2020: business support and development program. http://www.baiterek.gov.kz

Kalkabayeva, G., Kurmanalina, A., Gusmanova, Zh. (2017). Current State and Forecasting of the Development of Bank Crediting in

Kazakhstan. Journal of Advanced Research in Law and Economics, 4 (26), 1161-1166. https://doi.org/10.14505/jarle.v8.4(26).13

Website of the statistical service of the European Union. http://www.www.ec.europa.eu/eurostat

Rakhmetova, A., Kalkabayeva, G., Iskakova, Z., Kurmanalina, A., Turmakhanbetova, G. (2019). Institutional conditions of Interaction of Financial-credit and Innovative Economic sectors. *Entrepreneurship and sustainability Issuees*, 7(1). http://doi.org/10.9770/jesi.2019.7.1(51)

Gaukhar KALKABAYEVA is the Candidate of Economic Sciences, Associate Professor of Karaganda Economic University of Kazpotrebsoyuz, Karaganda, Kazakhstan. Research interests: bank lending; monetary policy; financial support for small and medium-sized businesses; sources of financing for the innovation sector
ORCID ID: orcid.org/0000-0002-5954-0787

Aibota RAKHMETOVA is the Doctor of Economic Sciences, Professor of Karaganda Economic University of Kazpotrebsoyuz, Karaganda, Kazakhstan. Research interests: problems of macroeconomic regulation; the interaction of the banking and real sectors of the economy; financial support for the development of real innovations; development of the banking system; role of financial and credit organizations in ensuring economic growth
ORCID ID: orcid.org/0000-0002-8741-0373

Gulmira NAKIPOVA is the Doctor of Economic Sciences, Protector for scientific work, strategic and innovative development of Karaganda Economic University of Kazpotrebsoyuz, Karaganda, Kazakhstan. Research interests: strategic management; marketing research, public administration
ORCID ID: orcid.org/0000-0001-6754-246X

Roza BESPAYEVA is the PhD, Docent of the Karaganda Economic University of Kazpotrebsoyuz. Research interests: strategic management in the field of tourism; issues of regional tourism development and related regulatory measures; government support single-industry towns; management of the innovative environment of the company town; integrated development; territory of advanced development.
ORCID ID: orcid.org/0000-0002-3955-9237

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Ziyada BORBASOVA is the Doctor of Economic Sciences, Professor of Karaganda Economic University of Kazpotrebsoyuz, Karaganda, Kazakhstan. Research interests: marketing, management, economics, agricultural business, tourism
ORCID ID: orcid.org/0000-0003-2314-7438

Yuliya SAIFULLINA is the Candidate of Economic Sciences, Associate Professor of Karaganda Economic University of Kazpotrebsoyuz, Karaganda, Kazakhstan. Research interests: banking management and banking marketing, credit relationships between the banking and real sectors of the economy
ORCID ID: orcid.org/0000-0002-1251-846X

Publisher
http://jssidoi.org/esc/home

INVESTMENT INCENTIVES AS INSTRUMENT OF MOTIVATION OF FIRMS AND ECONOMIC STABILIZATION[*]

Petr Musil [1], Veronika Hedija [2]

[1,2] Department of Economic Studies, College of Polytechnics Jihlava, Tolstého 16, 586 01 Jihlava, Czech Republic

E-mails:[1] Petr.Musil@vspj.cz ; [2] Veronika.Hedija@vspj.cz

Abstract. Investment incentives are mostly presented as an efficient tool of economic policy to eliminate negative impacts of economic cycle and also as the tools of motivation of firms to generation of investment. The aim of the paper is to verify the relationship between investment incentives and business cycle in the Czech Republic. There is used the data of CzechInvest, Czech Statistical Office and Organisation for Economic Cooperation and Development. To verify the link between the investment incentives and the business cycle, the Pearson correlation coefficient and Spearman correlation coefficient was used. There has been identified moderate positive relationship between the volume of the state support and the growth of the gross domestic product in constant prices. The link between investment incentives and output gap was not statistically significant. The study brings new insights on the field of investment incentives as an instrument of stabilization of economy. Investment incentives are important in terms of stimulating the investment activity of firms. Findings of the study answer the question of whether the government behaves responsibly in the area of investment incentives. The findings show that the policy of investment incentives does not respond flexibly to the current needs of the Czech economy.

Keywords: investment incentives; business cycle; Czech Republic; economic stability; gross domestic product

JEL Classifications: E22, E32

1. Introduction

An investment incentive can be understood as a measurable advantage granted by a government to a particular firm, firm or group of firms in order to induce them to behave. By using investment incentives, the state seeks to encourage an increase in the volume of investments in its territory (Srholec 2004). The investment incentive can be provided by the state in practically two ways. Direct financial support or indirect relief from state requirements to companies or individuals. Direct support may be represented by a subsidy for the purchase of machinery, land, infrastructure, equipment or other means of production. On the other hand, reliefs take the form of a reduction or total remission of taxes, duties, social security contributions, as well as exemptions from the obligations imposed on entities by the legal order.

The objectives of investment incentives may vary. Sometimes they are advocated to support less developed regions affected by the structural crisis, high unemployment and low living standards. At other times, economic policy makers expect investment incentives to contribute to the establishment of macroeconomic equilibrium, particularly with regard to the business cycle. If economic activity in the country is declining, unemployment tends to grow, then there should be an incentive that motivates the investor to allocate his capital to the economy that offers the incentive. Investment incentives began to be used more extensively in the Czech Republic in 1998, when the domestic economy underwent its first major recession after most of the measures for economic transformation were implemented (Žídek 2006). This was a direct consequence of the 1997 currency crisis, which spilled over into the real economy in the coming months.

Promoting investment as an effective remedy for economic downturn is entirely in line with the economic theory based on the teachings of John Maynard Keynes and his followers. Keynesians rely on the interconnection of the multiplier and accelerator principles to drive aggregate demand and thus help restore economic performance to its potential (Dornbusch, Fischer 2013). On the basis of this logic, massive support for investment by the state should come just at a time of decline in gross domestic product, and on the contrary, in times of rapid economic growth, the state should save on investment incentives. Accordingly, the volume of supported investments should also evolve, which should be countercyclical.

The aim of the paper is therefore to assess whether investment incentives have been treated in this way in the past 20 years. In particular, to assess the relationship between investment incentives in the Czech Republic and the evolution of the output of the economy and to assess whether the investment incentives were used to act counter-cyclically.

The findings of the study help us to answer the question of whether the government behaves responsibly in the area of investment incentives and whether their setting does not contribute to the deepening cyclical fluctuations of the economy.

2. Literature review and theory development

Investment incentives can be seen as one of the possible instruments for promoting economic growth, but also as an instrument for stabilizing the economy.

According to traditional macroeconomic theory, investment is one of the factors determining the level of equilibrium output of the economy and is also an important factor of economic growth. The increase of

investment in the country leads to an increase in aggregate demand and thus also to an increase in the real output of the economy. The accumulation of investment contributes to the growth of the country's production potential and thus to the growth of potential output (Dornbusch, Fischer 2013).

The impact of investment on the performance of the economy is examined by a number of empirical studies. These confirm the positive impact of investment on economic growth in most cases (Khan, Reinhart 1990; Anderson 1990; Bal et al. 2016). The empirical studies also confirm that the private investment appears to have a higher pro-growth effect compared to government investment (Khan, Reinhart 1990). Investment incentives can be seen as one of the possible instruments for promoting economic growth, but also as an instrument for stabilizing the economy.

According to traditional macroeconomic theory, investment is one of the factors determining the level of equilibrium output of the economy and is also a factor of economic growth. The increase in investment in the country leads to an increase in aggregate demand and thus also to an increase in the real output of the economy. The increase in investment as such contributes to the growth of the country's production potential and thus to the growth of potential output (Dornbusch, Fischer 2013).

The impact of investment on the performance of the economy is examined by a number of domestic and foreign studies. These mostly confirm the positive impact of investment on economic growth (Khan, Reinhart 1990; Anderson 1990; Bal et al. 2016). Private investment also appears to have a higher pro-growth effect compared to government investment (Khan, Reinhart 1990). The positive effect of investment on economic growth can also be found also in the Czech Republic. Křístková (2012) examines the impact of investment in science and research on economic growth in the Czech Republic. It concludes that these investments contribute to economic growth, but their impact is lower than that of investments in capital goods.

Some studies focus on examining the relationship between investment and the business cycle. According to Levy Yeyati et al. (2007), the economic cycle can affect investment through multiple factors. In the period of expansion (when the output is above the level of potential product) companies have higher incomes and profits and these motivate them to invest both in the home country and abroad. This effect who is referred as the 'income effect' by the authors, will lead to the so-called pro-cyclical behaviour of domestic investment and foreign direct investment abroad. On the other hand, so-called "substitution effect" will result in a situation where the economy is in the phase of expansion. It means that the firms will prefer domestic investment over foreign direct investment abroad. The reason is the expected higher return on domestic investment, as the expected value of investment during the period of expansion is growing. And also lower risk of domestic investment compared with foreign investment, especially those in developing countries. (Levy Yeyati et al. 2007)

The vast majority of empirical studies confirm of the fact that not only domestic investment but also foreign direct investment directed abroad are in line with the economic cycle. They tend to grow as economies are in a phase of expansion and decline in times of recession (for example, Levy Yeyati et al. 2007; Rodriguez, Bustillo 2015).

There are also number of studies examining the impact of investment incentives on economic development and selected macroeconomic indicators. The results of these studies are not uniform. Some studies confirm the positive impact of investment incentives on development of economy (mainly on productivity and employment) (for example Harris, Trainor 2005; Schalk, Untiedt 2000). Other papers do not identify statistically significant effect and these dominated (for example Daly et al. 1993; Bernini, Pellegrini 2011; Yanikkaya, Karaboga 2017).

However, the system of investment incentives varies among individual countries and also the effect of investment incentives policy on development of the county may be country specific. The results for the Czech Republic are not uniform too. Some studies identified the positive effect of investment incentives. For example, Adamek and Rybkova (2015) examined the effect of investment incentives on development of regional unemployment in the Czech Republic. They concluded that investment incentives can promoting employment and development of regions and have positive and statistically significant influence on regional employment. Pícl (2013) examined the system of investment incentives in the Czech Republic and assess their real impacts on the Czech economy. Based on the findings of own survey, he concludes that most of the supported investments would be realized without state financial support and the investment incentives have not significant impact on the level of investment. Bolcha and Zemplinerová (2012) examined the effect of investment incentives on firm real investments and concluded that the effectiveness of investment incentives is very low. The extra investment generated due to invement incentives was at most 26% of contracted amounts.

Some papers mention the negative circumstances of investment incentives, such as distorting the market, changing employment patterns, raising wage levels in poor regions, and thus dragging labour from local employers, we find quite a lot. One analysis is the study by Schwarz et al. (2007) prepared for the Ministry of Industry and Trade of the Czech Republic. The authors conclude that investment incentives merely substitute an insufficient level of key decision-making factors for investors: political stability, law enforcement, low taxes, functioning infrastructure and the quality of the workforce. Investment incentives are thus only at best the second best alternative if the government is unable to ensure the required level of these factors.

Although the real effect of investment incentives on economic output and economic growth is not clear, it is an important and frequently used instrument of economic policy.

3. Data and methods

The article aims to evaluate the relationship between the amount of investment incentives and the development of economic output. The data needed to assess the relationship are drawn from three sources. The first is CzechInvest, then the Czech Statistical Office (CSU) and the Organization for Economic Cooperation and Development (OECD).

The data on the amount of supported investments and the level of support (percentage of support of the realized investment) are taken from data provided by CzechInvest (2018). It is a contributory organization subordinated to the Ministry of Industry and Trade of the Czech Republic, whose main objective is to support entrepreneurship and investment and which also provides information on the amount of the granted investment incentives.

The data on the amount of supported investments and the aid intensity in the period 1998-2017 were used. The nominal values of the indicators and the values expressed in constant prices (2015 prices) are used for the calculations in order to adjust for the effect of changes in the price level. Consumer price index, which is derived from data provided by the Czech Statistical Office (2018), is used for conversion to constant prices. The output of the economy and its development is evaluated using the growth rate of real gross domestic product and the estimate of the output gap in 1998-2017. These data are drawn from data provided by the Czech Statistical Office (2018a) and data provided by the OECD (2018).

Pearson's correlation coefficient is used to assess the relationship between the amount of investment incentives and the output of the economy, respectively output gap. It is complemented by the Spearman's rank correlation

coefficient (de Vaus 2002). Spearman's rank correlation coefficient makes it possible to identify the relationship even in the case of existing non-linearity. The limits recommended by de Vaus (2002) for the evaluation of dependence in the social sciences are used to assess the strength of the relationship between the quantities under study. The calculations were carried out in the STATA program.

The Pearson´s correlation coefficient is calculated using the following formula:

$$r = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2 \sum_{i=1}^{n}(y_i - \bar{y})^2}} \; . \tag{1}$$

Where x_i and y_i are the quantities between which we investigate the relationship, $\bar{x}$ and $\bar{y}$ are the mean values of x_i and y_i.

The Spearman´ correlation coefficient is calculated as follows:

$$r = 1 - \frac{6\sum(Rx_i - Ry_i)^2}{n(n^2 - 1)} \; . \tag{2}$$

Where Rx_i and Ry_i - represent the order of values x_i and $y_{i.}$.

4. Results

All investment activity was very difficult immediately after the fall of the communist regime in November 1989. Forty years of a centrally planned economy took its toll. Capital was regarded in official circles as a term that was in stark contrast to the ideology of socialism. Accordingly, capital was also treated at the level of state or national enterprises. The result was its total shortage in the early 1990s (Žídek 2006).

It was possible to use foreign capital, but its flow was strictly limited until the mid-1990s. Foreign investment came to the Czech Republic to a very small extent. According to the Czech National Bank (2018), only 19 billion Czech crowns in foreign direct investment came to us in 1993. In 1996 it was almost 68 billion and a breakthrough occurred in 1998, when the Czech Republic for the first time flowed in direct foreign investment over 100 billion Czech crowns.

In the same year, the Investment Incentives Act came into force, on the basis of which domestic and foreign investors could apply for state aid. CzechInvest, which was established at the end of 1992 and is established by the Ministry of Industry and Trade, was in charge of the administration and assessment of applications. While in 1993 CzechInvest managed to make two investments worth 361 million Czech crowns, five years later (and probably due to the launch of investment incentives) it was already 41 investments worth 40 billion Czech crowns. Companies such as Johnson Controls (USA), Panasonic AVC (Japan) or Hella-Behr (Germany) came to the Czech Republic. In the coming years, the inflow of investment into the Czech Republic naturally intensified as the domestic economy became more and more stable and the risk of a reversal of the post-November development

decreased. The accession to the European Union in May 2004 became a definite signal that the Czech Republic is suitable for foreign investments.

Between 1998 and 2017, according to CzechInvest (2018), 1127 investment projects benefited from some form of state support, of which 53 percent were from abroad. Over 15 percent are in Germany, less than 5 percent in Japan or the Netherlands, while other countries occupy lower percentages. The total volume of investments supported by CzechInvest reached 864.3 billion Czech crowns in the period under review. The state supported them with the amount of almost 290 billion Czech crowns. Thus, the average aid intensity was 33.3 percent. In other words, one Czech crown was added by the state to every two Czech crowns invested.

Interestingly, the aid intensity has been decreasing in the long term. It reached its maximum (50 percent) only in 1999 and has been steadily declining ever since. It was the lowest (not counting the first year of existence of investment incentives) in 2016, at twenty percent.
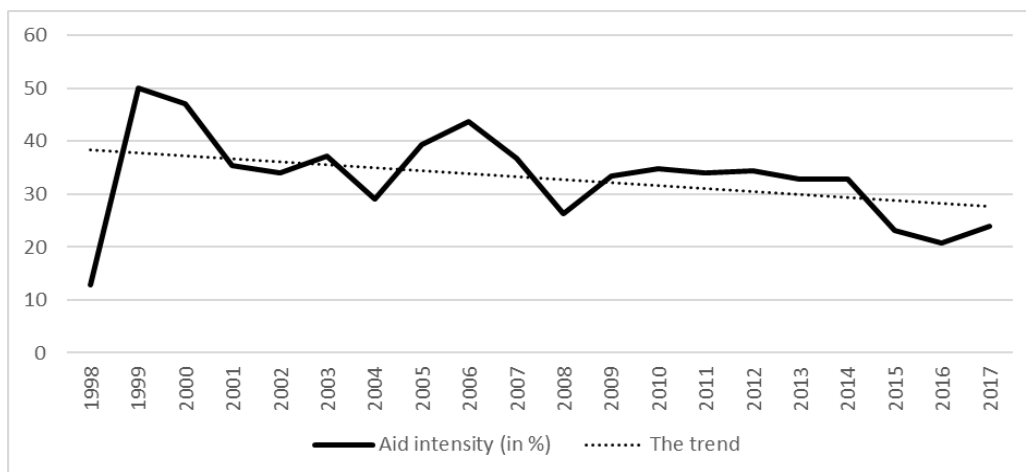
Figure 1. Aid intensity of investments supported by CzechInvest 1998 - 2017 (in %)
Source: CzechInvest (2018), own calculations

As already mentioned, it can be seen from Figure 1 that the aid intensity of investments declines over time. One explanation may be the fact that in the beginning of the examined period the (mainly) foreign investment was still under relatively high political risk in the Czech Republic. And the investors perceived this very sensitively. Therefore, the state compensated them precisely through relatively generous support.

This is also reflected in the rapidly increasing volume of supported investments in 2000 and 2001. The situation is illustrated in Figure 2, where we can see the development of the volume of supported investments in the period 1998-2017. In 2000, supported investments increased by 168 percent year on year, and grew by almost 27 percent in 2001.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
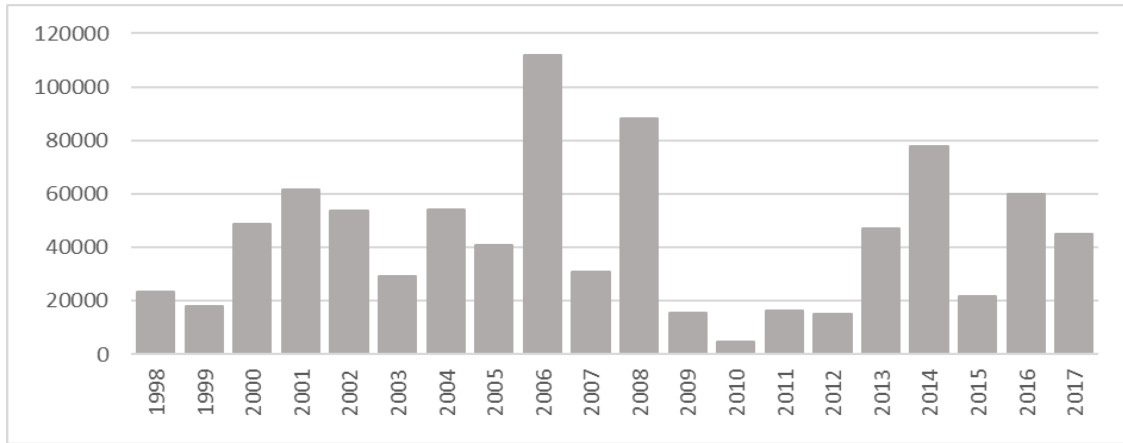
Figure 2. Volume of supported investments by CzechInvest in 1998 - 2017 (in millions of CZK)
Source: CzechInvest (2018)

As already mentioned, investment incentives are seen as a highly effective tool for eliminating the negative impacts of the business cycle. Thus, the volume of supported investments could be expected to grow as the economy goes through recession and, on the contrary, will dampen if economic growth shows a solid pace. The volume of supported investments should therefore develop counter-cyclically.
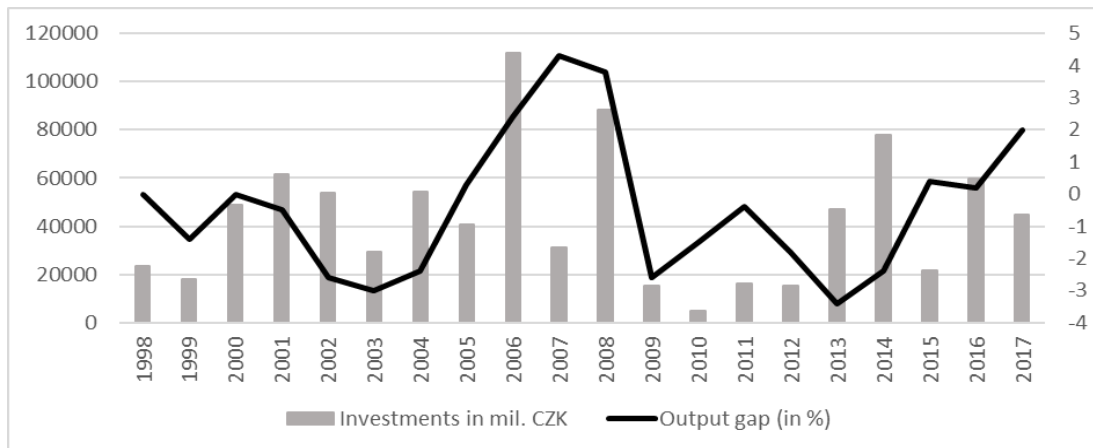
Figure 3. Volume of supported investments by CzechInvest and output gap in 1998 - 2017
(in millions of CZK, output gap in % - right axis)
Source: CzechInvest (2018), Czech Statistical Office (2018)

Figure 3 illustrates the evolution of the volume of supported investment and the growth rate of real gross domestic product over the period 1998-2017. The data show that in the period of growth in the performance of the Czech economy, the volume of supported investments increased and in the period of decline the volume of investment incentives decreased. This shows rather the pro-cyclical use of investment incentives. However, this hard one needs to be further examined for several reasons.

The growth rate of real gross domestic product does not faithfully reflect the business cycle. If the growth rate of real gross domestic product increase, this does not necessarily mean that the economy is reaching potential output. This may reflect the growth of the potential product as such. In other words, real gross domestic product growth is not adjusted for changes in potential output as such. The phase of the business cycle is best illustrated by the output gap, which is estimated as the difference between actual and potential product and is reported as a percentage of potential product.

Further distortion may result from the use of the absolute amount of supported investments. As the price level increases, so does the cost of the investments made and the absolute amounts that investors ask for. The real volume of investments does not need to change. It is therefore appropriate to take this into account in the analysis and to adjust the investment for the effect of the price level change. In assessing the counter-cyclicality of the investment incentives policy implemented, it is also necessary to distinguish between the total volume of supported investments and the actual amount of support, where the percentage of government funds in the supported investment may change over time and as shown in Figure 1 over the examined period.
The Pearson's correlation coefficient (equation 1) is used to assess the relationship between investment incentives and economic performance and the Spearman's order correlation coefficient (equation2) to capture the possible non-linearity of the relationship.

To take into account all of the above mentioned factors, we use alternative indicators for the amount of investment incentives and the output of the economy in our analysis. Investment incentives are used in the form of the total amount of supported investments in millions of CZK (investment incentives) and also as the amount of support that captures the actual volume of government funds directed at investment incentives in CZK million (supported volume). These indicators are examined in nominal and also absolute terms (in 2015 prices) to adjust it for the effect of price level changes. The output of the economy is measured by real gross domestic product growth rate and by output gap.

The results are shown in Table 1 and Table 2. Table 1 deals with the nominal value of investment incentives and the amount of aid, in Table 2 these indicators are adjusted for the price level and enter into the calculation, as already mentioned, in 2015 prices.

Table 1. Pearson´s and Spearman´s correlation coefficients (investment incentives in current prices)

Pearson´s correlation coefficient		
	Growth rate of real GDP (in %)	Output gap (in %)
Investment incentives	0.4284*	0.3372
Support volume	0.4769**	0.2775
N	20	20
Spearman´s correlation coefficient		
	Growth rate of real GDP (in %)	Output gap (in %)
Investment incentives	0.4400*	0.2303
Support volume	0.4325*	0.1310
N	20	20

Note: *** statistically significant at the 1% significance level, ** statistically significant at the 5% significance level, * statistically significant at the 10% significance level.
Source: own calculations in STATA

Table 2. Pearson´s and Spearman´s correlation coefficients (investment incentives in constant prices of 2015)

Pearson´s correlation coefficient		
	Growth rate of real GDP (in %)	Output gap (in %)
Investment incentives (in price 2015)	0.4554**	0.3228
Support volume (in price 2015)	0.4912**	0.2627
N	20	20
Spearman´s correlation coefficient		
	Growth rate of real GDP (in %)	Output gap (in %)
Investment incentives (in price 2015)	0.4453**	0.1837
Support volume (in price 2015)	0.4370*	0.0640
N	20	20

Note: *** statistically significant at the 1% significance level, ** statistically significant at the 5% significance level, * statistically significant at the 10% significance level.
Source: Own calculations in STATA

A statistically significant relationship between the level of investment incentives and the growth rate of real gross domestic product was identified in the examined period 1997-2017. In the years with a higher real gross domestic product growth rate, the amount of investment incentives also increased in the country. Depending on the level of Pearson and Spearman correlation coefficients, the strength of the identified relationship can be described as medium. When comparing the results in Tables 1 and 2, it can be stated that the identified relationship is stronger in the case of investments adjusted for the effect of price level changes (Table 2).

The conclusions are also similar for the relationship between the supported volume and the growth rate of real gross domestic product. Conversely, the relationship between the level of investment incentives and the output gap did not prove to be significant. Moreover, the value of correlation coefficients indicates the existence of a weak or insignificant relationship. Investment incentive policy is thus not used counter-cyclically.

5. Discussion

The findings of this study are not very surprising and show that the investment incentive policy does not respond flexibly to the current needs of the economy in terms of trying to stimulate the economy in times of recession and lower performance and, conversely, to subdue the economy at risk of overheating. Rather, the system appears to be pro-cyclical, with higher real output growth rates and positive corporate expectations motivating firms to invest more, and, if the system permits, they also benefit from investment incentives. As real gross domestic product increases, the amount of total investment incentives and the amount of support also increase.

Bolcha and Zemplinerová (2012) and Pícl (2013) pointed to the low effectiveness of investment incentives in relation to the volume of extra investment genderated due to investment incentives in the Czech Republic. Our findings show that the system si also rather pro-cyclical. From this point of view, the Czech investment incenstives system does not appear effective. Bolcha and Zemplinerová (2012) expect that the abolition of the investment incentives would have only the low effect on the total volume of investment, and it would bring savings in the form of state budget expenditures decline.

The issues of investment incentives impact on the state budget and gross domestic product growth are very interesting and important and deserve the deeper analysis in the Czech Republic. Harms and Meon (2018) show

that the different types of foreign direct investments can have a different effect on economic growth and conclude that greenfield invesments have a stronger impact on growth than mergers and acquisitions. The detailed analysis of the impacts of investment incentives on economic growth in the Czech Republic with a focus on various types of realized investments will be the subject of the further research.

Conclusions

Investment incentives are important in terms of stimulating the investment activity of firms. The article was devoted to the issue of investment incentives and to assessing whether investment incentives were used in the Czech Republic in the period 1998–2017 so that they could contribute to smoothing the economic cycle.

The principles of the system of investment incentives are briefly summarized in the paper. At the same time, it was stated what amount of investments the Czech state has supported through its CzechInvest agency over the past twenty years. Although the system was set up in such a way that entities regardless of their country of origin could benefit from it, initially it was mainly used by foreign investors. Only in recent years did Czech companies "level the score". The ratio of the number of Czech and foreign investors who received the incentive is virtually one to one in two decades.

The aid intensity has been decreasing since the start of the investment incentive scheme. It reached the highest, i.e. 50 percent, in 1999, in recent years it has been between 20 and 25 percent of the total volume of supported investments. Investment incentives can also be used as a tool for economic stabilization. In order the investment incentives could act counter-cyclically, it would have to be true that they are increasing at a time when the economy is below potential output and, on the contrary, declining when the output of the economy is above potential output.

Using the Pearson correlation coefficient and the Spearman order correlation coefficient, the relationship between investment incentives (represented by the total volume of supported investments by actual aid amount) and the performance of the economy (represented by real GDP growth rate and output gap) was tested. A statistically significant directly proportional moderate relationship between the level of investment incentives and real gross domestic product growth rate was identified. In other words, investment incentives, both in terms of total volume and actual aid intensity, grew at the same time as the growth rate of gross domestic product increased. Conversely, in a situation where the rate of gross domestic product growth declined (or was negative), investment incentives declined too. They could thus to some extent act pro-cyclically. On the other hand, the relationship between the level of investment incentives and the output gap, which more accurately reflects the evolution of the economic cycle than the actual growth rate of the real product, proved to be statistically insignificant.

So we can say that the government did not show any tendency to increase investment incentives at a time when the economy was below the potential output and vice versa. The main driver of investment incentives seems to be the interest of companies and investors, which logically grows at a time when the economy is reaching higher growth rates of its performance.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

References

Adámek, E. & Rybková, L. (2015). Influence of Investment Incentives on Development of Regional Unemployment in the Czech Republic. *European Journal of Business Science and Technology,* 1(1), 5-14. https://doi.org/10.11118/ejobsat.v1i1.33

Anderson, D. (1990). Investment and Economic Growth. *World Development,* 18, 1057-1079.

Bal, P. D., Devi, P. D. & Subhasish. B. (2016). The Effects of Capital Formation on Economic Growth in India: Evidence from ARDL-bound Testing Approach. *Global Business Review,* 17(6), 1388-1400. https://doi.org/10.1177/0972150916660403

Bernini, C. & Pellegrini, G. (2011). How Are Growth and Productivity in Private Firms Affected by Public Subsidy? Evidence from a Regional Policy. *Regional Science and Urban Economics*, 41(3), 253–265. https://doi.org/10.1016/j.regsciurbeco.2011.01.005

Bolcha, P. & Zemplinerová, A. (2012). The Effect of Investment Incentives on Investment in the Czech Republic. *Politická ekonomie*, 60(1), 81-100. https://doi.org/10.18267/j.polek.833

Czech National Bank (2018). *Data přímých zahraničních investic (Direct Investment Incentives Data).* Retrieved March 16, 2020, from https://www.cnb.cz/cs/statistika/platebni_bilance_stat/publikace_pb/pzi/

Czech Statistical Office (2018). *Index spotřebitelských cen – inflace - časové řady (Consumer Price Index – Time series).* Retrieved March 16, 2020, from https://www.czso.cz/csu/czso/isc_cr.

Czech Statistical Office (2018a). *Hlavní makroekonomické ukazatele (Main Macroeconomics Indicators).* Retrieved March 16, 2020, from https://www.czso.cz/csu/czso/hmu_cr.

CzechInvest (2018). *Udělené investiční pobídky k 31.9.2018 (Investment incentives in 31/9/2018).* Retrieved March 16, 2020, from https://www.czechinvest.org/cz/Sluzby-pro-investory/Investicni-pobidky.

Daly, M., Gorman, I., Lenjosek, G., Macnevin, A. & Phiriyapreunt, W. (1993). The Impact of Regional Investment Incentives on Employment and Productivity - Some Canadian Evidence. *Regional Science and Urban Economics,* 23(4), 559–575.

De Vaus, D. (2002). *Analyzing Social Science Data. 50 Key Problems in Data Analysis*. London: Sage Publications.

Dornbusch, R. & Fischer, S. (2013). *Macroeconomics.* New York: McGraw-Hill.

Harms, P. & Méon, P. G. (2018). Good and useless FDI: The growth effects of greenfield investment and mergers and acquisitions. *Review of International Economics*, 26(1), 37–59. https://doi.org/10.1111/roie.12302

Harris, R. & Trainor, M. (2005). Capital Subsidies and Their Impact on Total Factor Productivity: Firm-Level Evidence from Northern Ireland. *Journal of Regional Science,* 45(1), 49–74. https://doi.org/10.1111/j.0022-4146.2005.00364.x

Khan, M. S. & Reinhart, C. M. (1990). Private Investment and Economic Growth in Developing Countries. *World Development*, 18(1), 19-27.

Křístková, Z. (2012). Impact of R&D Investment on Economic Growth of the Czech Republic – A Recursively Dynamic CGE Approach. *Prague Economic Papers,* 2012(4), 412-433. https://doi.org/10.18267/j.pep.432

Levy Yeyati, E., Panizza, U. & Stein, E. (2007). The Cyclical Nature of North-South FDI Flows. *Journal of International Money and Finance*, 26(1), 104–130.

Ministry of Industry and Trade (2018). Zákon č. 72/2000 Sb. o investičních pobídkách ve znění pozdějších předpisů (Act No. 72/2000 Coll., on Investment Incentives). Retrieved May 12, 2020, from https://www.mpo.cz/assets/cz/podnikani/dotace-a-podpora-podnikani/investicni-pobidky-a-prumyslove-zony/investicni-pobidky/2016/12/Zakon-o-investicnich-pobidkach_84_2015.pdf.

OECD (2018). *Economic Outlook November 2018.* Retrieved November 16, 2019, from http://www.oecd.org/eco/outlook/economic-outlook/

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Pícl, M. (2013). Impact of incentive driven investment in the Czech Republic. *Business and IT*, 2013(2), 43-64.

Rodriguez, C. & Bustillo, R. (2015). Foreign Direct Investment and the Business Cycle: New Insights after the Great Recession. *Prague Economic Papers,* 2015(2), 136-153. https://doi.org/10.18267/j.pep.505

Schalk, H. J. & Untiedt, G. (2000). Regional Investment Incentives in Germany: Impacts on Factor Demand and Growth. *The Annals of Regional Science,* 34(2), 173–195. https://doi.org/10.1007/s001689900008

Schwarz, J. et al. (2007). Analýza investičních pobídek v České republice (Invesmtent Incentives Analysis). Praha: Ministerstvo průmyslu a obchodu. Retrieved May 9, 2020, from https://www.mpo.cz/assets/dokumenty/32013/35445/388865/priloha001.pdf

Srholec, M. (2004). *Přímé zahraniční investice v České republice – Teorie a praxe v mezinárodním srovnávání (Foreign Direct Investment in the Czech Republic – Theory and Practice in International comparison).* Praha: Linde.

Yanikkaya, H. & Karaboga, H. (2017). The Effectiveness of Investment Incentives in the Turkish Manufacturing Industry. *Prague Economic Papers,* 26(6), 744–760. https://doi.org/10.18267/j.pep.641

Žídek, L. (2006). *Transformace české ekonomiky 1989 – 2004 (Transformation of the Czech Economy 1989-2004).* Praha: C. H. Beck.

Petr MUSIL is the Assistant professor at the Department of Economic Studies of the College of Polytechnics Jihlava. Research interests: economic policy; wage inequality; economic growth and sustainability; renewable energy sources policy.
ORCID ID: orcid.org/0000-0002-8164-2181

Veronika HEDIJA is the Assistant professor at the Department of Economic Studies of the College of Polytechnics Jihlava. Research interests: firm performance; sustainability; women in leadership; gender wage differences.
ORCID ID: orcid.org/0000-0002-5353-1505

TAX AVOIDANCE: THE ASPECT OF VALUE ADDED TAX[*]

Egidijus Bikas [1], Greta Bagdonaitė [2]

[1,2] *Vilnius University, Suletekio av.9, Vilnius, LT-10222, Republic of Lithuania*

E-mails:[1] egidijus.bikas@evaf.vu.lt ; [2]gretabagdonaite51@gmail.com

Abstract. Tax avoidance is probably as old phenomenon as the taxes themselves. The literature has disclosed that tax avoidance is a worrying problem facing not only the Baltic economies but also the global economy. Tax avoidance and VAT in particular, undoubtedly causes significant damage to the functioning of the public sector and to the financing of public expenditure, because the fiscal significance of this tax is very high. On the other hand, the VAT gap is a significant problem, as in Lithuania in the period of 2012 - 2018 it ranged from 200 to 300 million Euros; the Lithuania's budget lost so much money every quarter. The article aims to identify the factors influencing the VAT gap in the Baltic States. The study is performed using quantitative methods. The influence of optional factors on the VAT gap is determined by performing a correlation-regression analysis of the Baltic States. The study showed that the tax gap, migration and tax rate factors had the largest impact on the VAT gap in the Baltic States.

Keywords: taxation, tax behavioral, tax avoidance, Value added tax

1. Introduction

Taxes are the most important source of state's revenue. The goal of each country is to create a tax system that would promote the growth of the country's economy and ensure sufficient income to perform state functions. Tax revenue is an important factor influencing the efficient performance of state functions, on which not only the state's welfare but also the prosperity of its citizens depends. It is the behavior of taxpayers that determines what

part of tax revenue will be collected to the budget and how efficiently the state will be able to perform its functions.

The main problem facing national governments is decision what and how to tax, what tax rates to apply in order to make the country's tax system fair, simple, efficient and elastic. An unsuitable tax system in a country encourages tax avoidance, which has enormous consequences for the state, because it hinders development of the country's economy and the future of the state.

OECD (2015), Keen (2012), indicate the importance of tax collection in developing countries. The loss of tax revenue estimated at more than $ 3.1 trillion, or about 5.1 % of world's GDP. It means that about 54.9 % of health care expenditure is lost due to the tax avoidance. The impact of tax avoidance is greater in developing countries than in developed countries. Tax justice network (2011) paid attention to the fact that because of tax avoidance 97.7 % of health care budget is lost in African countries and more than one hundred percent in South American countries.

The state provides security and public goods to the entities, and they in return, must pay taxes. However, there are always those who want to use the goods provided by the state without paying for them. This behavior of taxpayers unbalances the state budget as the tax revenue collected becomes less than the expenditure. This leads to a budget deficit, and the remaining gap is filled with borrowed funds. Therefore, the goal of each country in the field of taxation is to create a tax system that would promote economic growth and ensure stable state revenues.

Tax avoidance is one of the most important problems facing all countries in the world today and accounts for a large enough share of the unaccounted economy. Tax avoidance can be equated with a tax gap, which indicates how much of the potential tax revenue the state does not collect into the budget due to one or another behavior of taxpayers. Most of the revenue to the state budget is collected from value added tax (VAT), but on the other hand, this tax is one of the most vulnerable, as there are cases of fraud related to the development of VAT schemes, concealment of part of turnover and falsified VAT invoicing, all unaccounted for sums of money for goods or services sold in order to reduce the VAT obligation. Therefore, it is important to know why taxpayers assume such behavior, what factors may lead to it. Once identified, the factors and causes of VAT avoidance can reduce the amount of revenue lost by the state. The problem of VAT avoidance is valid not only in the European Union but also worldwide, and the issue has not been investigated in detail due to data limitations, changes in calculation methodologies and the identification of complex causality.

The problem of tax and VAT avoidance in the world has been studied by many researchers (Ivaškaitė - Tamošiūnė, 2014; Giriūnienė, 2014; Bikas, 2019; Medelienė et al., 2011; Novošinskienė et al., 2007; Šinkūnienė, 2005; Keen et al., 2014; Borselli et al., 2012; Simionescu et al., 2016; Sasongko et al., 2019). Researchers emphasized that VAT is one of the main parts of tax revenue to the state budget, therefore, its collection is very important for the welfare of the state, but unanimous opinions and detailed analyses of VAT avoidance, what affects the VAT gap, what factors shape this tax avoidance behavior is missing.

The aim of the article is to analyze the factors influencing the VAT gap in the Baltic States.

The analysis and systematization of scientific literature, legal acts and statistical data was performed during the while analyzing the avoidance of tax and VAT avoidance. Based on the collected data, the analysis of the factors influencing VAT collection in the Baltic States is performed. Regression models of the Baltic States have been developed, with the help of which the main factors influencing the VAT gap in the Baltic States are mathematically expressed.

2. Theoretical background

Without taxes, modern society would not be able to survive, but despite state laws and regulations, there are people trying to avoid paying taxes. The optimal level of public goods provided by public authorities is only achieved when each taxpayer is honest and pays a part of his or her tax liabilities (Batrancea et al., 2012; Čižo et al., 2020). Franzoni (2000) identifies four basic rules that a taxpayer must follow in order to execute tax laws honestly:

1. Notify the tax authorities of the actual tax base;
2. Calculate the tax liability correctly;
3. Return the tax declaration on time;
4. Pay the amounts of money on time.

If at least one of these rules is violated, the taxpayer becomes ineligible, and non-compliance with the requirements also leads to tax avoidance.

Vasiliauskas (2005) names the concept of tax avoidance as, an violation of rights in order to obtain a tax benefit, which is understood as tax reduction or non-payment of taxes (using tax law provisions or reliefs), trying to create special tax conditions, to simulate a business model and thus obtain tax benefits. According to Paulauskas (2006), this behavior is called the most intelligent violation of tax laws. A taxpayer consciously evades tax obligations or reduces taxes without violating established legal acts, but his actions are contrary to the meaning of the law. These concepts are also supported by Palijanskas (2003), who describes tax avoidance as a taxpayer's activity aimed at "circumventing" the provisions of the law by formally following the established procedures without violating them. The concept of tax avoidance is complemented by James et. al., (2002) that tax avoidance considered a legitimate act of taxpayers because it is the application of loopholes in legislation system to reduce taxes. Tax avoidance includes not only the reduction of the tax burden, but also obtaining other tax benefits: deferral of the tax payment term, increase of the overpaid (deductible) tax overpayment (difference) and shortening of the tax overpayment (difference) reimbursement of taxes (Paulauskas, 2006). It can be said that tax avoidance is the legal action of taxpayers to take advantage of loopholes in legislation to reduce or avoid paying taxes. Tax avoidance is the main problem faced by the state in order to collect as much tax revenue as possible to the budget.

The willingness to avoid taxes is widespread in all countries of the world. According to the European Commission, EU Member States lose billions of euros in VAT revenue every year due to tax fraud and an inadequate tax collection system. The VAT gap, which is the difference between the estimated VAT revenue and the VAT actually collected, anticipates the loss of revenue because tax fraud, tax evasion and tax avoidance, but also due to bankruptcies, financial insolvency or loss-free calculation. The VAT gap is calculated by comparing actual VAT receipts with theoretical VAT liabilities (Reckon, 2009).

Compared to other misuses, VAT avoidance and evasion causes the greatest financial loss. The damage done to the states is particularly significant when in companies avoid VAT being paid internationally, when dozens of companies are involved in criminal activities in different countries of the European Union. By making fictitious transactions between themselves, companies seek to avoid paying VAT in some countries and to recover it fraudulently from national budgets. The German Ministry of Finance (2018) complements the range of forms of VAT avoidance and evasion from undeclared and/or unpaid VAT to the unfair right to use deductible input tax, known as 'carousel' VAT fraud. When dishonest unscrupulous suppliers collect large amounts of VAT from their customers and disappear before the tax authorities check the taxes.

In addition, the EU's fight against VAT fraud and avoidance considered the most important objective in the development of new EU legislation. Walpole (2014) argues that VAT avoidance and evasion involves a number of activities that deprive the state's treasury of the revenue will need to be collected legally. Unlike other taxes, VAT has two distinct areas in which taxpayers can target their fraudulent activities: they cannot only manipulate their liability for VAT, but can also abuse the purchase of VAT recovery mechanism, which is a way of using public funds.

In order to combat VAT avoidance, it is appropriate to identify factors that may influence taxpayers' behavior. There are many studies in the scientific literature which provide different opinions and identify the main factors influencing tax avoidance in different countries, but there are only a few studies that analyze VAT avoidance. Kiri (2016) states that the tax rate, audit probability, and the amount of the fine are the main factors influencing the level of tax avoidance. In addition, analyzing secondary sources, the authors found out that in some countries, the rate of tax avoidance decreases with increasing tax rates, while in other countries the opposite effect may occur. The results of the research differ because each country has its own specific characteristics. A study conducted by Richardson (2006) who evaluated data from 45 countries showed that non-economic factors have the greatest impact on tax avoidance compared to economic factors. The regression analysis results indicated that the less complex the taxes are and the higher the education of taxpayers is, the lower is the level of tax avoidance in all countries. The dependence on the unemployment rate and tax avoidance is emphasized by Lisi (2012). The author points out that a company's decision to avoid taxes depends on trust in the institution of tax administration, and it influences one of the most important macroeconomic variables i.e. the unemployment rate. Pomnerehme et al. (1996) analyzed Swiss data in order to determine taxpayer avoidance responses to changes in tax rates. The authors attributed to the dependent variable the difference between the declared income of taxpayers and national accounts data. The authors attributed average marginal tax rates, audit probabilities, and other indicators as independent variables. The results of the regression analysis showed that the relationship between marginal tax rates and tax avoidance is positive and statistically significant. According to Fisman et al. (2001) 1 percentage point increase in tax rates leads to 3 percentage point increase in tax avoidance.

Therefore based on the analyzed scientific sources, it was observed that tax collection and VAT are analyzed by various quantitative and qualitative methods. Many Lithuanian and foreign authors studied different aspects of tax and VAT avoidance, therefore, the research methodology is based on the scientific publications and research made by the following authors: Keen (2012) - examined the importance of tax collection in developing countries, Marandul et al. (2015), Itashiki (2011) and Bame-Aldred et al. (2011) were, interested in taxpayers' behavior, their values and sought to find out the reasons and connections that determine people's choice to avoid taxes, Bikas et al., 2020 assessed the impact of some variables on the VAT gap in Lithuania. Keen et al. (2014), examined VAT tax and its collection in the European Union countries, Borselli et al. (2012) analyzed the factors which reduce the ability to collect as much VAT revenue as possible to the state budget.

Summarizing, it can be said that studies produced in different countries show, that taxpayers' behavior in tax avoidance affects different factors in each country. Studies reveal that in some countries the effects of certain factors differ from other countries. It only proves that it is very important to single out the main factors influencing VAT avoidance. Based on the analyzed scientific literature and methods, it was chosen to analyze the VAT tax gap in the Baltic States and to investigate the factors that influence the VAT tax gap.

3. Research objective and methodology

In order to assess the impact of individual macro factors on VAT collection and the gap, the method of correlation regression analysis was chosen. According to Pabedinskaitė (2009), this method is widely used in social, economic and physical sciences while investigating various phenomena. Correlation regression analysis helps to determine the relationship between the variables under consideration and their interaction. Correlation, in this case, describes the strength of a relationship between variables, and regression analysis helps to determine the nature of that relationship and to describe the dependence of the mean values of a dependent variable on one or more independent variables using mathematical formulas. The result of the research is a regression equation, which shows the relationship between the factors and answers the question of how the average value of the examined economic phenomenon changes due to the factors on which it depends.

Correlation regression analysis consists of several important steps. It is determined which independent variables have the greatest impact on the dependent. A regression analysis is performed, during which regression equations are formed, which describe the relationship of the dependent variable with each independent variable individually. Correlation regression analysis is performed, which covers all the most significant factors previously selected. A multiple regression equation is also mode, showing the direction and strength of the effects of the factors under consideration (Pabedinskaitė, 2009).

A linear multiple regression model was used to the study, as the influence of many factors on the phenomenon under study investigated. The sum of the effects of all these factors will form the total influence on the phenomenon under consideration, and the influence of each individual factor, which is called partial, will be determined assuming that the values of other independent variables are constant (Krikštolaitis, 2007).

Three Baltic countries are analyzed - Lithuania, Latvia, Estonia. The choice of these countries was determined by the similar economic and social level of the countries and their regional policy.

The constructed models belong to linear multiple regression models because they are dependence equations having more than one independent variable. The purpose of the regression model is to quantify the impact of selected factors on the VAT gap. The influence of factors is estimated on the basis of regression model coefficients, which are calculated during the modeling process. Thus, regression models for all three Baltic countries will be developed to mathematically assess the factors influencing the VAT gap. For the regression models, a 95% confidence interval for the interval estimates was chosen, which indicates that 5% error is possible.

In the regression equation, the independent variables were chosen based on the potential risks and impact on VAT. The selected factors are adapted to the Baltic market, i.e. the same factors are analyzed in Lithuania, Latvia and Estonia. Eight variables were selected for analysis and included in equation (1). The VAT rate was used only in the Latvian regression model, because only in Latvia did the VAT rate change during the period under review.

$$Y_{\text{VAT gap}} = \beta_0 + \beta_1 X_{\text{GDP}} + \beta_2 X_{\text{consumption}} + \beta_3 X_{\text{VAT rate}} + \beta_4 X_{\text{average wage}} + \beta_5 X_{\text{burden of taxes}} + \beta_6 X_{\text{inflation}} + \beta_7 X_{\text{unemployment rate}} + \beta_8 X_{\text{migration}} + \varepsilon, \quad (1)$$

The resulting equation is evaluated by the selected variables. One of the criteria is "ANOVA". This is a summary of the Stjudent t criterion for several independent samples. This indicator shows whether there is at least one statistically significant variable in the obtained model (Bekešienė, 2015). The ANOVA p-value must be less than

0.05. Stjudent's t criterion is applied to independent samples when we want to compare the average of independent groups. If the corresponding p-value is <0.05, it means that this variable must be eliminated from the equation. One of the most important characteristics of the suitability of the model is the coefficient of determination (R-square). It shows the part of the variation that is explained by the model. A regression model with R squared <0.25 is considered inappropriate. It also cannot said based on this coefficient, that the model is appropriate for the data available. However, the higher this coefficient is, the more accurately it is possible to calculate the dependent variable from the independent ones (Bekešienė, 2015).

The research method is used to examine the dependence of the VAT gap on its determinants, which will also reflect tax avoidance, and the factors that cause it. This will provide to answer to the main question of the study - what factors and what influence do they have on the VAT gap in the Baltic States? The data on the VAT gap in the Baltic States are collected and processed on the basis of the study on the VAT gap in the EU countries conducted by the European Commission CASE (2019). VAT data is the period of 2012 - 2018, on the basis of which the difference between the theoretically planned collections of VAT revenue collection the amount to the budget, i.e. VAT gap. Other data required for the survey are collected and processed using the database of Statistics Lithuania and the database of the Statistical Office of the European Union - Eurostat. It was chosen to study the quarterly data of 2012 - 2018 in order to obtain more representative survey results. The regression models of the Baltic countries were created applying Excel program.

4. Results and discussion

Three Baltic States - Lithuania, Latvia and Estonia were selected for the study. These countries were chosen because of the similar level of economic development of neighboring countries, similar statistical indicators and VAT rates (Table 1).

Table 1. Statistics of the Baltic States (2017)

INDICATOR	LITHUANIA	LATVIA	ESTONIA
Population	2 827 947	1 944 565	1 305 755
Area	65 300 km²	64 589 km²	45 226 km²
GDP (nominal)	$48 132 bn.	$20 101 bn.	$16 410 bn.
GDP (nominal) per capita	$16 709	$15 613	$20 170
Gini coefficient	36	37,7	34
Human Social Development Index (HDI)	0,862	0,855	0,86
VAT rate	21%	21%	20%

Source: Lithuanian Statistics database

Statistics from the Baltic States show that all countries are similar not only in terms of population and area, but also in economic indicators.

The object of research selected for linear regression analysis (dependent variable is: Y - VAT gap and eight independent variables X - Gross domestic product per capita, value added tax rate, average earnings (gross), household consumption from GDP, tax burden, inflation, unemployment in the country and migration, which can affect VAT gap.

The VAT gap is calculated by deducting from the planned amount of VAT to be collected the actual amount of VAT that has been collected to the state budget (2).

$$\text{VAT gap} = \text{VAT}_{plan} - \text{VAT}_{fact} \text{ (2)}$$

It should be noted that the largest VAT gap in the Baltic States in the period 2012 - 2018 was in Lithuania, it ranged from 200 to 300 million Euros (Figure 1). Lithuania lost such amounts of money on a quarterly basis in the period of 2012-2018. The smallest VAT gap prevailed in Estonia, from 25 to 80 million Euros, which is three times more than the VAT collected in Lithuania. The Latvian VAT gap compared to Lithuanian and Estonian results is average it ranged from about 60 to 160 million Euros. On this basis, it can be said that this is probably the most volatile fluctuation of the VAT gap, which started to decrease quite rapidly since the second quarter of 2012, and that more and more VAT was collected in each quarter of the period under review.
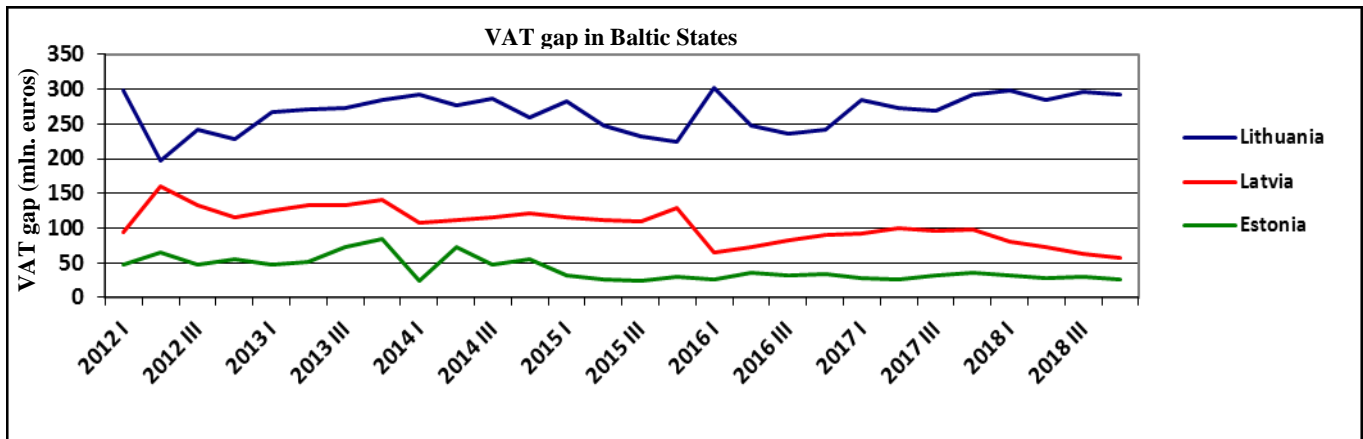
Figure 1. VAT gap in the Baltic States in 2012-2018 (compiled by the author based on the data of the EC survey (2019)

Lithuania is the first Baltic country chosen for the study. After systematizing all the quarterly data of the dependent variable and the independent variables for 2012–2018, the scattering of the values of the dependent variable is analyzed and the relationship between the variables is graphically represented before the initial regression equation is made. The values of the dependent variable are plotted on the vertical axis and those of independent factors are on the horizontal axis (Figure 2).
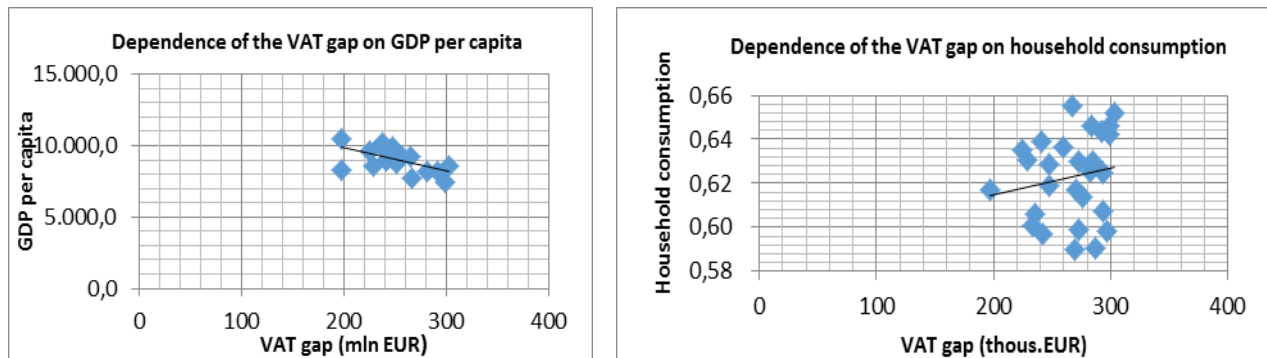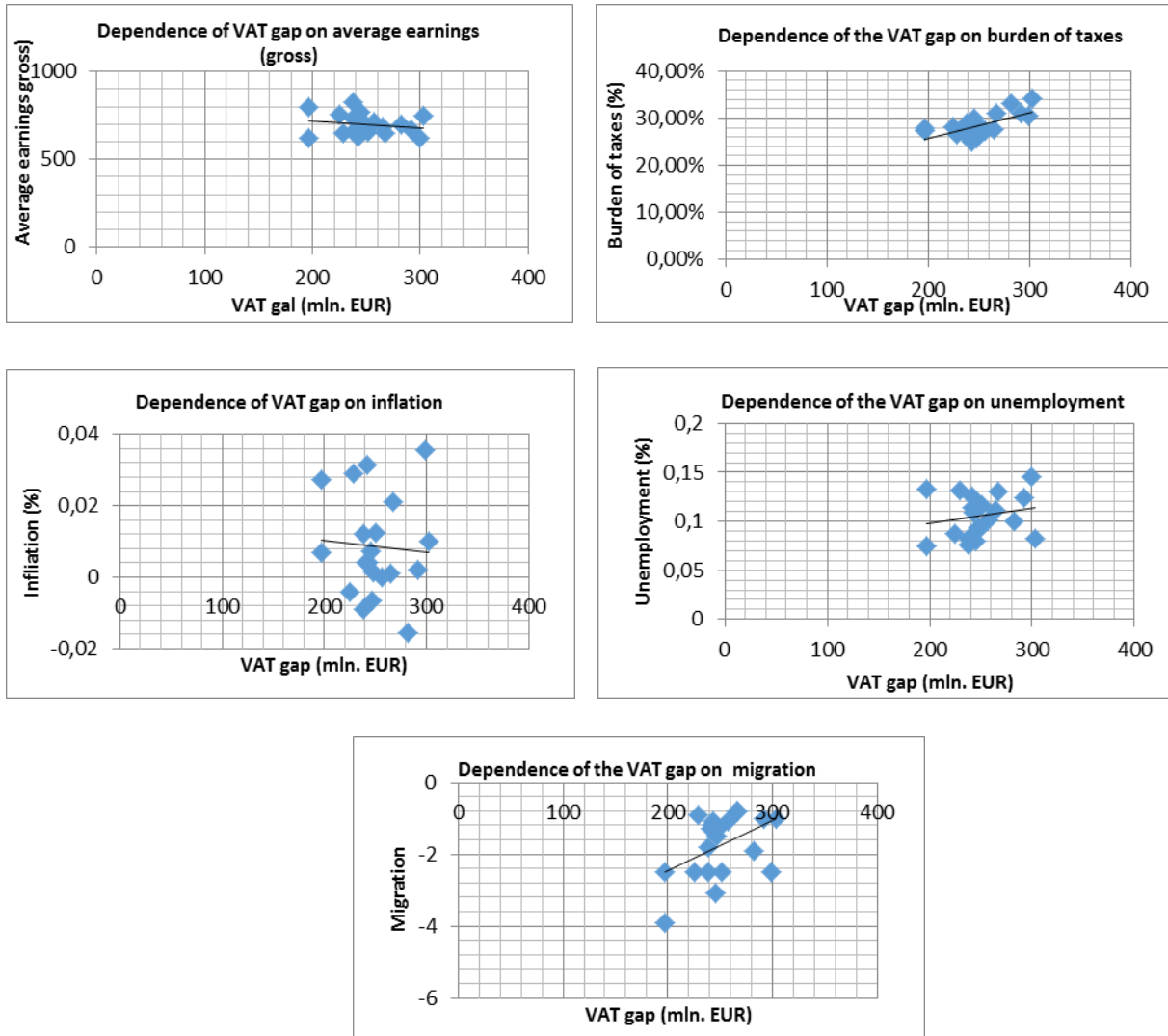
Figure 2. Dissemination of dependent and independent variables in Lithuanian

The obtained results showed that the increase of GDP per capita has a positive effect on the VAT gap in Lithuania, when the GDP increases, the VAT gap decreases and vice versa. The data are very unevenly distributed, so it can be concluded that household consumption does not affect the VAT gap. The average wage does not have a significant impact on the VAT gap, but the tax burden increases when the tax burden increases, and the VAT gap in Lithuania increases too. Inflation, like the unemployment rate, is not significant for the variable under discussion, and the data are unevenly distributed. However, migration is significant because the VAT gap narrows as migration increases. The initial regression equation (3) is constructed and obtained:

$$Y_{VAT\ gap} = 4,6910 - 0,0075X_{GDP} + 0,0543_{consumption} - 0,1714X_{average\ wage} + 9,7627X_{burden\ of\ taxes} + 0,3012X_{infliation} + 0,0920X_{unemployment\ rate} - 1,3635X_{migration} + \varepsilon \qquad (3)$$

The coefficient of determination is checked, which shows the percentage significance of the selected factors of VAT gap. The higher the value of this coefficient, is, the data fit the selected model better. The coefficient of determination of the initial regression model of Lithuania is 0,682467. It can be said that the significance of this regression model is sufficient for the analysis. The ANOVA p – value is also checked, it shows whether the value of at least one independent coefficient is statistically significant with the dependent variable Y. In the case of Lithuania, the value of p is equal to 0,009. If p <0.05, it can be stated that some factors exist which are related to the dependent variable in the model. In the model p = 0,009 <0.05, on this basis it can be said that at least one factor which make impact on the VAT gap.

Solving the regression analysis task the question arises whether the independent variable X influences the change of the dependent Y. Theoretical T (test) statistics calculated, according to which it can be assessed the significance of other factors and in order to eliminate the least significant factors for the VAT gap. The theoretical value of T is 2.0484, and comparing the theoretical value obtained with the calculated values obtained by constructing a regression model in order to exclude the least significant factors. If the theoretical value of t is greater than the calculated value of t, the factor is significant and we leave it, but if the calculated value of t is greater than the theoretical value of t, then the factor eliminated. The factors are eliminated from the smallest to the largest corresponding the equation: t theoretical > │t is calculated. Based on the values of the T statistics, the significant factors are selected and the correlation is calculated.

The least significant factors for the Lithuanian VAT gap are following: household consumption expenditure (-0,9854); average salary (gross) (-0,5444); unemployment rate in the country (0,0078); inflation rate (0,0619). Having rejected excluding insignificant factors, the coefficient of determination (R square) was rechecked again. After elimination of the factors, the value of the square of R is 0,6735. The correlation of the remaining factors determining the Lithuanian VAT gap was checked. The correlation between the variables did not change after rejected of the insignificant factors, therefore, based on the obtained data, it can be stated that correlation between the VAT gap and GDP (-0,5731), tax burden (0,6499) and migration (0,4599) factors is very strong. After checking the statistical indicators, the final equation of the linear regression of the Lithuanian VAT gap is presented (4):

$$Y_{VAT\ gap} = 11,8037 - 0,0047X_{GDP} + 7,0425X_{burden\ of\ taxes} - 1,4282X_{migration} + \varepsilon \qquad (4)$$

The obtained results of the research indicate that the tax burden had the greatest significance for the VAT gap in the period of 2012 – 2018 i.e. if it increases by one unit, the VAT gap increase by 7,0425 times. Migration in the country is also a very important factor, if it increases by one unit, the VAT gap in Lithuania decreases by 1,4282 times and vice versa, and an increase in GDP per capita by one unit will reduce the VAT gap by 0,0047 times.

The next Baltic country to be analyzed is Latvia. Although it is said that the economies of the Baltic States are similar and their economic problems are similar, their solutions are often different, so the factors influencing them can be very different. The Latvian regression model is supplemented by another factor - the VAT rate. To tentatively estimate the dependence of the VAT gap, the dissemination of the factors (independent variables) and the dependent variable are compiled before the initial regression equation is constructed (Figure 3.).
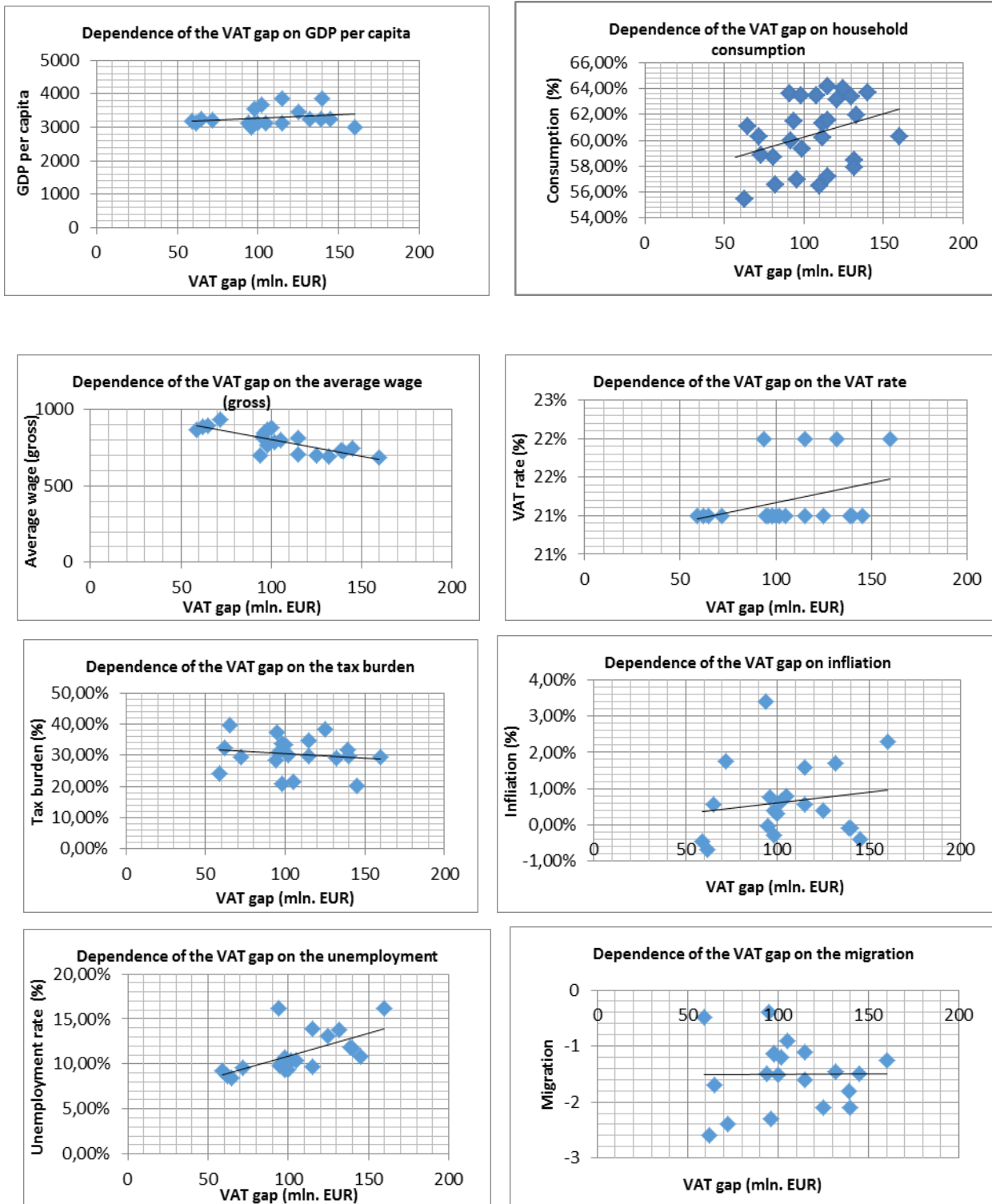
Figure 3. Dissemination of dependent and independent variables in Latvia

The results show that in Latvia, GDP and migration indicators have a very small impact on the VAT gap. Household consumption has a minimal impact on the VAT gap, as the data are not trend-oriented. However, the growth of average wage has a positive effect on the VAT tax, the higher it is the smaller the VAT gap is. The relationship between the VAT rate and the tax burden is rather difficult to assess evaluate because of very uneven distribution of data. Inflation data are also very unevenly distributed, but there is the dependence which indicates that the higher the inflation is, the larger the VAT gap is. However, if the sufficiently even dependence of the VAT gap on the unemployment rate is, the higher is this indicator, and the wider is the VAT gap. The initial regression equation (5) is formed:

$$Y_{VAT\ gap} = 6,8840 - 0,0014X_{GDP} + 4,0865X_{consumption} - 0,2857X_{average\ wage} + 0,6708X_{tax\ burden} + 3,4048X_{infliation} + 2,8721X_{unemployment\ rate} - 3,4939X_{migration} + 1,7693X_{VAT\ rate} + \varepsilon \qquad (5)$$

The coefficient of determination of the initial regression model of Latvia, R square, is slightly higher than that of Lithuania 0,8174. The ANOVA p - value is checked, it shows whether the value of at least one independent coefficient is statistically significant with the dependent variable Y. In the case of Lithuania, the value of p is 0,022. Thus, in our model p = 0,022 <0.05, on this basis it can be stated that at least one factor influences the VAT gap. As in the Lithuanian regression model, there is need to check whether the independent variable X affects the dependent Y. At the initial level of the regression model, theoretical T (test) statistics is calculated, according to which the significance of other factors is evaluated and the least significant factors are eliminated. As the same error and the same amount of data applied to all countries, the theoretical value of t remains the same for all Baltic countries. Thus, the theoretical value of t is 2,0484. This theoretical value is compared with the calculated values and the factors are eliminated from the lowest to the highest value that do not satisfy this equation - t theoretical > │t. Based on the values of T statistics, the factors with the greatest influence are selected. The result shows that the tax burden, unemployment rate, inflation and migration have a minimal correlation with the VAT gap. After eliminating the insignificant factors, the coefficient of determination is checked again. The square of R is equal to 0,7954. The coefficient of determination decreased slightly with the removal of insignificant factors 0,7954 < 0,8174. Based on the obtained data, it can be said that the strongest link between the Latvian VAT gap is with the average wage (-0,7909), the VAT rate (0,3494) and GDP (-0,2064). Final equation for linear regression of the Latvian VAT gap is (6):

$$\mathbf{Y_{VAT\ gap} = 7,4088 - 0,0054X_{GDP} - 0,3470X_{average\ wage} + 1,6070X_{VAT\ rate} + \varepsilon} \quad (6)$$

Summarizing, it can be stated that the Latvian VAT gap is influenced by GDP, average wages and the VAT rate. However, the VAT rate is of the most importance. If the VAT rate increases by one unit, the VAT gap will increase 1,6 times, if the average wage changes by one unit, the VAT gap changes by 0,3470 times, and if the GDP unit increases by one unit, the VAT gap decreases by 0.0054 times.

The next Baltic country under investigation is Estonia. This country in 2012 - 2018 had the smallest VAT gap from the Baltic States. Therefore, it is important to find out what factors are most important for the VAT gap in this country. Before constructing the initial regression model, we identify the dependences of the dispersion of the VAT gap on the factors are identified so their interdependence can be assessed tentatively (Figure 4).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
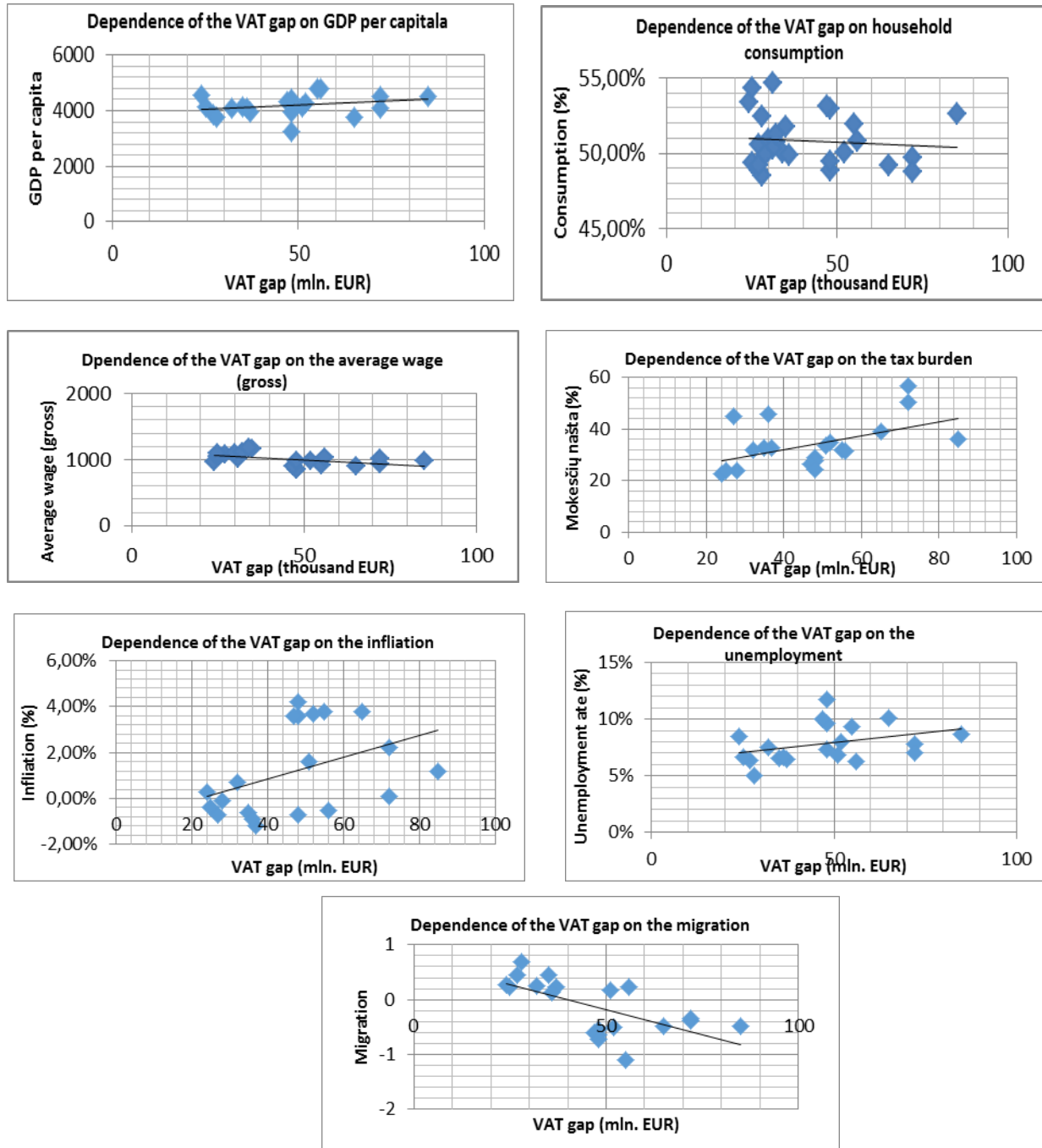
Figure 4. Dissemination dependent and independent variables in Estonia.

The results indicate that the dependence of GDP data on the VAT gap is very inconsistent. The GDP indicator does not make a significant difference to the VAT gap. The higher the average wage in Estonia is, the lower the VAT is, therefore, this factor may be significant for dependent variable. The increase in the tax burden, as well as in

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

inflation, widens the VAT gap. The VAT gap is negatively affected by the unemployment rate, and as it increases, the VAT gap increases too. The positive value of migration clearly reduces the VAT gap and the negative one increases it.

After the preliminary factor dependence analysis, the initial regression equation is formed (7):

$$Y_{VAT\ gap} = 17,6220 - 0,0097X_{GDP} + 2,4102X_{consumption} - 0,0277X_{average\ wage} + 0,8508X_{tax\ burden}$$
$$+1,5912X_{infliation} + 2,0864X_{unemploydment\ rate} - 1,6109X_{migration} + \varepsilon \quad (7)$$

The coefficient of determination (R square) is checked, which helps to find out the suitability of the data for our chosen model. The coefficient of determination of the initial model of Estonian regression is obtained at 0,7513, i.e. smaller than in Latvia, but similar to Lithuania. Based on the value of the coefficient of determination, it can be said that our data are suitable for this model and it will be significant enough. The ANOVA p – value is also checked, with the help of which is defined whether the value of at least one independent coefficient is statistically significant with the selected dependent variable Y (value added tax gap). In the case of Estonia, a p-value is 0,0002, i. p = 0,0002 <0,05, it can be said, that at least one selected factor influences the VAT gap. The theoretical T (test) statistics of the regression model is calculated, according to which the significance of other factors is evaluated and the least significant factors are eliminated. The theoretical value of T is 2,0484. Excluding insignificant factors, it can be said that the factors influencing the VAT gap in Estonia are as follows: average wages (gross), the tax burden in the country and migration. After eliminating the insignificant factors, the coefficient of determination is checked again, where the square of R is 0,7043. The R square factor decreased slightly to 0,7043 <0,7513. Correlation analysis shows that the strongest correlation between the VAT gap is with average wages (-0,5832) and migration (-0,6342). Thus, after examining the key indicators, the final equation for the linear regression of the Estonian VAT gap can be presented (8):

$$\mathbf{Y_{VAT\ gap} = 17,6168 - 0,0013X_{average\ wage} + 1,8300X_{tax\ burden} - 0,6521X_{migration} + \varepsilon} \quad (8)$$

As it has been mentioned, according to the data of the EC VAT gap survey (CASE, 2019), the largest VAT gap in 2012-2018 was in Lithuania and the smallest in Estonia. The data on the Latvian VAT gap is between Lithuania and Estonia, but the data was much closer to Estonia, which shows that the VAT gap was not as big as in Lithuania. From the obtained Baltic regression models it can be stated that the indicator of GDP per capita in the analyzed period had a significance only for the Lithuanian and Latvian VAT gap, but very insignificant, as the coefficients for these variables are very small 0,0047 and 0,0054, respectively. The average wage depended on VAT gap also to a very small extent only in Latvia and Estonia. There were two factors that had no effect on the VAT gap in all Baltic countries: inflation and the unemployment rate in the countries. The VAT rate was used as an independent variable only in the Latvian regression model, because only in Latvia there was a change in the VAT rate during the period under review. The study showed that the VAT rate is a significant factor in the VAT gap, and as the rate in Latvia increases, so does the VAT gap. And the last two factors that were among the most influential in Lithuania and Estonia during the period under review were the tax burden and migration in the country. As the tax burden increased, it also widened the VAT gap quite significantly. Similarly, when the migration rate was positive (with more arrivals than departures), the VAT gap narrowed, and when it was negative (with more departures than arrivals), the VAT gap widened.

Summarizing all the factors determining the VAT gap, it can be divided into significant, less significant and insignificant factors. The greatest significance of the Baltic VAT gap is the tax burden, migration, and VAT rate. Among the insignificant ones are GDP and average wages, and the factors that are insignificant for the VAT gap in

the Baltic States were inflation and the unemployment rate in the country. On the other hand, the study revealed that all Baltic States needs to review their common tax policy, assess the tax burden and the standard VAT rate in order to reduce the VAT gap and VAT evasion.

Conclusions

The VAT gap provides for a significant loss of revenue due to tax evasion. The Baltic States 2012 - 2018 lost 11.5 million euros during the period. VAT revenue due to tax avoidance, tax evasion and inadequate tax collection systems.

The study showed that the tax gap, migration and VAT rate factors had the largest impact on the VAT gap in the Baltic States. Less significant factors were average wages and gross domestic product, while insignificant factors were household consumption, unemployment in the country and inflation.

The study showed that in Latvia, the VAT rate is a significant factor in the VAT gap, as the tax rate increases, so does the VAT gap. In Lithuania and Estonia, a significant factor in the VAT gap is the tax burden. The growing tax burden poses problems for tax evasion.

References

Bame-Aldred, C., Cullen, J., Martin, K., Parboteeah, K. (2011). National Culture and firm-level tax evasion. *Journal of Business Research*, p. 1-7. http://dx.doi.org/10.1016/j.jbusres.2011.08.020

Bekešienė, S. (2015). Duomenų analizės SPSS pagrindai (Basics of data analysis SPSS). Vilnius: Generolo Jono Žemaičio Lietuvos karo akademija.

Bikas, E. (2019). Mokesčių šerdis – PVM (The core of the tax is VAT). Vilnius: VU leidykla.

Bikas, E., Malikonyte, G. (2020). Assessment of factors determining VAT gap: a case study of Lithuania. *Journal of Security and Sustainability Issues* 10(1) https://doi.org/10.9770/jssi.2020.10.1(3)

Batrancea, L.M., Nichita, R. A., Batrancea, I., Moldovan, B. A. (2012). Tax Compliance Models: from Economic to Behavioral Approaches. *Transylvanian Review of Administrative Sciences*, 36(E/2012), 13-26 https://rtsa.ro/tras/index.php/tras/article/viewFile/58/54

Borselli, F., Chiri, S., Romagnano, E. (2012). Patterns of reduced VAT rates in the European Union. *International VAT Monitor,* 23(1), 13–21.

CASE. (2019). Study and reports on the VAT Gap in the EU-28 Member State: (2019). Final Report. https://ec.europa.eu/taxation_customs/sites/taxation/files/vat-gap-full-report-2019_en.pdf

Čižo, E., Lavrinenko, O., Ignatjeva, S. (2020). Analysis of the relationship between financial development and economic growth in the EU countries**.** *Insights into Regional Development*, 2(3), 645-660. https://doi.org/10.9770/IRD.2020.2.3(3)

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Fisman, R., Shang-Jin, W. (2001). Tax Rates and Tax Evasion: Evidence from "Missing Import" in China. *NBER Working Paper* N0. 8551.

Franzoni, L. A. (2000). Tax Evasion and Tax Compliance. *Encyclopedia of Law and Economics, vol. IV, Cheltenham: Edward Elgar Publishing,* p. 51-94.

Giriūnienė, G. (2014). Šalies mokesčių sistemos vertinimas verslumo skaitinimo aspektu (Evaluation of the country's tax system from the aspect of entrepreneurship). Daktaro disertacija. Kaunas: Kauno technologijos universitetas.

Itashiki, M. (2011). Explaining "everyday crime": a test of anomie and relative deprivation theory. *Unpublished doctor of philosophy dissertation.* University of North Texas.

Ivaškaitė-Tamošiūnė, V. (2014). Perskirstomasis pridėtinės vertės mokesčio vaidmuo Lietuvoje (The redistributive role of value added tax in Lithuania). *Lietuvos socialinių tyrimų centras, socialinės gerovės institutas*.

James, S., Alley, C. (2002). Tax Compliance, Self-Assessment and Tax Administration. *Journal of Finance and Management in Public Services,* 2(2), 27-42.

Keen, M. (2012). Taxation and Development. *New York: International Monetary Fund, Working Paper /12/220*.

Keen, M., Konrad, K. A. (2014). The theory of international tax competition and coordination, Chapter Auerbach A. J.,Chetty, R. M, Feldstein, E. Saez (Eds.). *Handbook of Public Economics*. Amsterdam Elsevier Science B.V.

Kiri, N. (2016). Factors Affecting Tax Evasion. *International Journal of Economics, Commerce and Managment*, IV(2), 804-811. http://ijecm.co.uk/wp-content/uploads/2016/02/4249.pdf

Krikštolaitis, R. (2007). Priklausomybės tyrimas (Research of interrelation). *VDU*, Kaunas.

Lisi, G. (2012). Unemployment, Tax Evasion and the „Slippery Slope" Framework. *MPRA Paper*, No. 37433. https://mpra.ub.uni-muenchen.de/37433/1/MPRA_paper_37433.pdf

Medelienė, A., Sudavičius, B. (2011). Mokesčių teisė (Tax law). Vilnius: VĮ Registrų centras.

Marandu1, E.E., Mbekomize1, J.C., Ifezue1, N.I. (2015). Determinants of Tax Compliance: A Review of Factors and Conceptualizations. *International Journal of Economics and Finance. Published by Canadian Center of Science and Education* 7(9). http://dx.doi.org/10.5539/ijef.v7n9p207

Novošinskienė, A., Slavickienė, A. (2007). Lietuvos mokesčių sistemos vertinimas (Assessment of the Lithuanian tax system) Vaga, p. 65-71.

OECD. (2015). Building Tax Culture, Compliance and Citizenship. *A Global Source Book on Taxpayer Education*.

Pabedinskaitė, A. (2009). Kiekybinių sprendimų metodai (Quantitative decision methods) Vilnius: VGTU leidykla.

Palijanskas M. (2003). Mokesčių planavimo teisinis reguliavimas (Legal regulation of tax planning). *Apskaitos ir mokesčių apžvalga* 11. p. 82.

Paulauskas, A. (2006). Mokesčių vengimo sąvoka, požymiai bei santykis su mokesčių slėpimu (The concept of tax evasion, its symptoms and the relationship with tax evasion). Vilnius: *Viešoji politika ir administravimas,* 1,: 27–42.

Pommerehne, W., Weck-Hannemann, H. (1996). Tax Rates, Tax Administration and Income Tax Evasion in Switzer- land, *Public Choice*, 88(1-2), 161-170. http://dx.doi.org/10.1007/BF00130416.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Reckon, L. L. P. (2009). Study to quantify and analyse the VAT gap in the EU-25 Member States. *Report for DG Taxation and Customs Union,* 20, 5-109. http://dx.doi.org/10.2139/ssrn.2693524.

Richardson, G. (2006). Determinants of Tax Evasion: a Cross – country Investigation. *Journal of International Accounting, Audit and Taxation*, 15(2), 150-169.

Sasongko, G., Huruta, A.D., Wardani, A. (2019). Does the Wagner's Law exist in a strategic national area? An evidence from Kedungsepur – Indonesia. *Insights into Regional Development*,1(2), 99-117. https://doi.org/10.9770/ird.2019.1.2(2)

Simionescu, M., & Albu, L.-L. (2016). The impact of standard value added tax on economic growth in CEE-5 countries: econometric analysis and simulations. *Technological and Economic Development of Economy*, 22(6), 850-866. https://doi.org/10.3846/20294913.2016.1244710.

Šinkūnienė, K. (2005). Taxation principles in Tax Culture: theoretical and Practical aspects. *Organizacijų Vadyba: Sisteminiai tyrimai.* Nr. 35.

Tax justice network. (2011). The Cost of Tax Abuse. A brieging papero n the cost of tax evasion worldwide. https://www.taxjustice.net/wp-content/uploads/2014/04/Cost-of-Tax-Abuse-TJN-2011.pdf.

Vasiliauskas, V. (2005). Optimizuoti ar vengti? (Optimize or avoid?) *Apskaitos ir mokesčių apžvalga*, 5, 30-40.

Federal Ministry of Finance (2018). https://www.bundesfinanzministerium.de/Web/EN/Issues/Taxation/VAT/vat.html

Walpole, M. (2014). Tackling VAT Fraud. *International VAT monitor September/October.*

Dr. Egidijus BIKAS is associate professor at the Department of Finance, Faculty of Economics and Business Administration, Vilnius University, Lithuania. Research interests: taxation, tax behavior, public finances.
ORCID ID: orcid.org/0000-0002-9055-2989

Greta BAGDONAITĖ is a master of Faculty of Economics and Business Administration, Vilnius University, Lithuania.
Research interests: taxation, public finances.
ORCID ID: orcid.org/0000-0003-0207-4209

THE REMITTANCE INFLOWS IN VISEGRAD COUNTRIES: A SOURCE OF ECONOMIC GROWTH, OR MIGRATION POLICY MISTING?[*]

Ladislav Kabat [1], Lubos Cibak [2], Stanislav Filip [3]

[1,2,3] *University of Economics and Public Administration Management in Bratislava, Furdekova 16, 85104 Bratislava, Slovak Republic*

E-mails:[1] ladislav.kabat@vsemvs.sk ; [2] lubos.cibak@vsemvs.sk ; [3]stanislav.filip@vsemvs.sk

Abstract. The global economy and worldwide open market of goods and services creates a favorable environment for expanding technological cooperation among countries. However, such development is also accompanied by an intense movement of the labor force. After opening the EU single market, a large number of foreign workers from the new member countries found the better paying jobs in the highly developed EU countries. The total volume of this financial compensation that was transferred into mother countries was more than USD 70 billion in 2017. A primary question for this situation is the role that these financial sources play in the economies of the mother countries. Have the transferred money contributed to economic growth or have they been materialized in the sphere of private household consumption? Our paper answers these questions in the case of the Visegrad (V4) countries. The scientific literature does not offer a unified position in this respect. The positive, neutral, and negative impacts on concerned economies are presented. In our view, the answers should be verified in the specific conditions of the beneficiary countries, taking into account all the statistically relevant factors. The primary source of our information is statistical data of international organizations, particularly of the United Nations (UN), the World Bank, the Organization for Economic Cooperation and Development (OECD), the European Union, and the International Organization for Migration. As a tool for solution was applied the analysis of panel data.

Keywords: foreign direct investment; portfolio investment; economic growth; GDP; unemployment; regional development

---

1. Introduction

The global economy and worldwide open market create a favorable environment for expanding technological cooperation among countries. However, such development is also accompanied by an intense movement of the labor force. Consequently, the flow of financial remittances paid to the foreign labor force became an interesting topic for research and scientific studies. The cardinal question is whether the remittances received by an individual country have an impact on the country´s GDP growth.

After the opening of the EU single market, a large number of foreign workers from the new EU member countries found better paying positions in the highly developed EU countries. The total volume of such financial compensation transferred was more than USD 70 billion in 2017. According to valid data on the labor force movements, the large share of these financial means was transferred into the new EU member countries.

Faced with this situation, we raise the following question: what role did these financial sources play in the economies of the mother countries? Did these financial sources contribute to economic growth, or had they been materialized in the sphere of private household consumption?

Searching for the generally accepted answer is not an easy task, having in mind the large differences in volume of remittances transferred, the level of economic and social development in the receiving countries, the quality of transferring institutions and of the entrepreneurial environment, and the possibilities for investment of the external finances in the mother countries.

The main objective of this article is to verify the hypothesis on the impact of the remittance inflows on economic growth in the mother countries. For verification of the above hypothesis, we used econometric modelling, particularly the panel data analysis and Granger causality testing. The countries included in the study are the Visegrad Group (V4) countries: the Czech Republic, Hungary, Poland, and Slovakia.

We also use statistical data collected and processed by selected international organizations, particularly the United Nations, the World Bank, the Organization for Economic Cooperation and Development (OECD), the European Union (EU), and the International Organization for Migration (IOM).

2. Review of literature: migration and migrants

International migration, or the movement of people across the borders of countries, has historically occurred since ancient times and has happened for different reasons. While international migration has always had a major impact on the socio-economic environment or poverty alleviation in the countries of origin, it has also made an impact on the social and demographic structure of the targeted countries. Migration has influenced not only the economic but also the social and demographic environment of both host and parent countries.

The migration of humanity constitutes a special socio-demographic movement and has different forms, scopes, and durations as well as a considerably long history in virtually all parts of the world (www.historyworld.net). More recently, migration has been in the spotlight of the media and the professional public, as presented by Pooley (2019) and Hoerder. (2017)

According to Demirguc-Kunt (2019), the high degree of globalization in international and regional economies is one of the key factors that enhances interregional migration flows. Persistent differences in the income levels of the population as well as national and regional unrest and conflicts of war are also classified among the pro-migration factors.

Available statistics from the International Organization for Migration indicate that currently some 271 million people are living outside of their mother countries, which represents approximately 3.5% of the global population. More detailed statistical information on the reasons for this situation are found according to individual migration segments, including migrants, expatriates, clandestine migrants, immigrants, people who temporarily resettle, asylum seekers, and refugees, IMO (2020). However, the accuracy of statistics on migration flows, as highlighted by Alvarez (2015), is problematic to estimate.

The movements of residents from the mother country to the host country are referred to as migratory waves and are identified as immigration and emigration. The first case is represented by the "inflow" of people to the host country, and the latter case represents the "outflow" of residents from the parent country. The reasons for these movements may vary, as presented and analyzed by Castelli (2018); Consumer (2020); Filipek (2019); Hendricks (2019).

Generally, the migrants who leave the mother country tend to look for an opportunity to improve their personal and family economic and social situation. These migrants are classified as economic migrants. The main objectives of their migratory movement are mostly to seek countries with a higher level of economic development, a higher standard of living, and the possibility of an official access to the labor market as well as subsequently to achieve full incorporation into the social environment of the new country Kováč,M.(2015), Vaysilova (2019). Globally, approximately 266 million migrants are currently statistically classified as economic migrants. Most of them have the opportunity to enter the labor market and to obtain the officially reported salary as a domestic labor force. The financial compensation of these migrants, after transferring to the home countries is known as remittances World Bank (2016),

Extensive information sources confirm that migrants are an important factor in the host country's economy. According Kosten (2018), "the migrants play a crucial role in the U.S.A. labor force". The study of the University of Pennsylvania (2016) also confirms the importance of "the active participation of migrants in technical innovation and intellectual creativity in various academic and research fields across the US economy."

According to UN Secretary-General A. Guterres (2018), "the managed migration is one of the most challenging but also a promising social movement and opportunity for enhancing the international cooperation across the industrial and developing countries."

3. Migration remittances: what do they bring our countries?

Evidence of the active participation of migrants in the economic development of host countries is found in the increasing volume of remittances that are directly related to their labor activity. According the World Bank (2019), the volume of remittances transferred to the mother countries in 2018 was over USD 689 billion, whereby USD 529 billion (76%) was transferred to beneficiaries in low-income developing countries. The high volume of reported financial transfers "become over time one of the important external sources of their economic growth". Similar conclusions are presented by other sources World Bank (2016), OECD (2020).

The published outputs indicate a wide range of the assessed impact of remittances on the economies of the mother countries, ranging from a highly positive evaluation to the lack of any impact. Some articles even identified remittances as "corruption inhibitors", and therefore, they should be classified as a negative factor in the economic environment.

In this article, we specifically address the impact of migrant remittances on the economies of the Visegrad Group (V4) countries. We compare the volume and economic efficiency of the received remittances in these countries with the results of selected studies for another countries. We also present the various positions on the evaluation of the role of remittances in the economic growth of selected countries.

Meyer and Sherab (2016) have studied the impact of remittances on economic growth using the panel data approach to assess six remittance-receiving Balkan countries during the period 1999–2013. Their final analysis confirmed that remittances have a positive impact on economic growth in mother countries.

According to Nita (2016) "the remittances in Romania also have a positive impact on the economic development of this country." A similar position about Romania´s experience is presented by Comes (2018) et al.. Simonescu (2019) demonstrates a more complex evaluation of remittances that indicates both positive and negative aspects of migration flows in the context of Romanian membership to the EU. According to Cismas et al., "the hypothesis that remittances has a significant influence on the Romanian economy was not validated, and the statistical data does not show a long-run neither a short-run influence or a Granger causality."

A slightly similar conclusion is presented by Rauser et al. (2018) who posit that the remittances have a positive impact on the economic development in Lithuania, Latvia, and Estonia.

A certain level of skepticism in the evaluation of the remittances impact is also presented by Sobiech (2019) who found that "remittances can foster growth, but the effect is significant only at low levels of financial development of the individual country." In line with many other authors, he also believes that the remittances play an important role in alleviating poverty at the household level.

The role of remittances in securing the durability of economic growth in developing countries was studied by Adams Mensah Klobodu (2016). He found that remittance do not have a robust impact on the economic growth in Sub-Saharan African countries. However, as a byproduct of his study, he identified the so-called "institutional linkages" of remittances, meaning that the growth effect of remittances is enhanced by a stable and democratic government. Another conclusion is offered by Coulibaly (2015) who notes that no strong evidence exists to support the view that remittances promote financial development in Sub-Saharan African countries.

A strong position on the short-term and long-term effects of remittances is offered by Barajas et al (2010). Their study relies on the analysis of the development of remittance flows between 1970 and 2004 for 84 countries. According to these authors, the remittances have poverty-alleviating and consumption-smoothing effects on recipient households. Furthermore, Azam (2016) highlights that migration and remittances have first-order effects on poverty. This finding is based on a study representing 39 countries of high-, middle-, and low-income countries across the world.

A more cautious stance in evaluating the effectiveness of remittances is upheld by Clemens (2016). Similarly, according to Chami et al.(2018), "remittances are essential to fight poverty, but they failed to identify the remittances' impact on economic growth". The authors also identified the accompanying negative effects of

remittances, which often "contributes to weakening the entrepreneurial activity of young people, relying on external sources" which means accepting the downsides of the "Dutch disease."

Several authors from developing countries have made valuable findings on the negative phenomena identified in the analysis of the remittance flows. Specifically, these studies have mentioned the phenomenon of corruption, which has been identified as an endogenous factor at various levels of the economic implementation of remittances. Muhhamad and Khairuzzaman (2013) have examined this problem through a data base for five countries of South and Southeast Asia for the period 1985–2011. Applying the econometric model, they "found the positive and statistically significant effects of FDI and workers remittances on economic growth"; however, the empirical results simultaneously demonstrate the negative and statistically significant impact of endemic corruption on economic growth.

An exact analysis of remittances and corruption was studied on panel data from 122 countries by Majeed (2016), who identified that "among the least corrupt countries, remittances do not appear to increase corruption but, among the most corrupt countries, it significantly contributes to growth of corruption behavior." These findings are quite understandable and could help to assess situation for the majority of central European countries as well.
An in-depth study on remittances and corruption was conducted with data from 127 countries by Tyburski (2014), who adopted the political economy methodology to analyze these two phenomena. He found that democratic institutions significantly reduce the probability that remittances increase corruption and that democracies tend to control corruption better than nondemocratic regimes. According the author, "the remittances should be considered as a curse but also as a cure for corruption." Another strong position about the outcome of remittance inflows is presented by Berdiev et al.(2013), who have also identified the existence of a negative institutional impact.

The fact that the published results evidently indicate a wide range of unsolved problems related to the inflow and outflow of remittances is important to underline. In particular, many articles draw attention to the ambiguous impact on the economies of the beneficiary countries. We follow this position when presenting our results.

4. Are there real causal relations between remittances and economic growth?

Furthermore, the published scientific findings that are unsure about making direct causal links between correlated variables deserve greater attention. Aldrich (2018) presents various scenarios of the inappropriate and incorrect application of the methods of correlation and regression analysis. The findings highlight the repeated errors in the methodologies of research projects and publications by arguing that "...correlation alone cannot be used as evidence for a causal-and-effect relationship between a treatment and benefit, a risk factor and a disease, or a social or economic factor and various outcomes."

An important position is presented by Kahn (2018), who notes that "causal effects are difficult to quantify because we rarely observe occasions, where one variable is changed while others are constant." Such methodological weakness have also been studied by Bleske-Rechek (2015) who underlined that little systematic data is available to the extent that individuals conflate correlation with causation. She also found that people frequently tend to draw causal outcomes from non-causal data, regardless of the statistical findings.

An noteworthy study of the correlation and causality phenomena is offered by Panizza and Presbytero (2014). They studied if public debt has a causal effect on GDP growth in OECD countries. According their findings, a

negative correlation exists between debt and growth. However, the link between debt and growth disappears after the researchers corrected the model for endogeneity.

The highly qualified approach to the problem of identification and differentiation between correlation and causal relationships has also been developed in biological science, as presented by Berwick (2017).

In conclusion, finding answers to questions about the impact of remittance payments on the volume or the growth of GDP and GDP per capita is more complex than it appears at first glance in light of the studies previously presented. To respond to the research topic properly, extending the model instruments in such a way as to eliminate the incorrect interpretations of correlation and causal relations is necessary.

5. Objectives of the article

The dynamic of migration movements in Czechia, Hungary, Poland, and Slovakia are the subject of sharp political and expert discussions in these countries. In particular, the financial flows that represent compensation are closely monitored for migrant workers who operate abroad outside of their parent country. Given that these financial flows are mainly directed from industrialized countries to countries with a lower level of economic potential, they are analyzed not only in terms of their volume but also in terms of their potential impact on the dynamics of the economy of the parent countries whose citizens are the beneficiaries of these means. For many countries, the volume is comparable to the volume of external financial resources such as the official development assistance (e.g., Official Development Aid or ODA) and direct foreign investment (e.g., Foreign Direct Investment or FDI). Therefore, the question under investigation is whether these resources have a positive impact on the dynamics of the growth of the national economy, namely the economies of the countries to which the remittances are directed.

Based on the literature, we segmented the arguments and conclusions into the following groups:
1. Tne first group of authors presents conclusions on the **clear positive impact** of remittances on the economic growth of the beneficiary countries. These positions are based on model projections, in which the volume of remittances is identified as one of the statistically significant explanatory variables.
2. Based on similar model instruments, another group of authors offers **more cautious conclusions** on impact of remittances on GDPpc. The effect of remittances is presented as accompanying phenomenon with the other development assistance sources. Also, the statistical significance of the REMIN confirm to this conclusion.
3. Another group of authors rejects the general conclusions on the positive impact of remittance on economic growth of the beneficiary countries. These authors, based on more sophisticated modelling analyses, highlight the negative effects on the corruption environment which is detrimental to the home economies. Important warnings exist also about the insufficient verification of the causal effects of remittance on economic growth.
4. Interesting results are presented by authors who highlight the institutional aspects of the environment in which remittance inflows are materialized. The quality and efficiency of relevant government institutions and their democratically functioning structures and processes are pointed.

The main objective of our paper is to verify the remittance inflows and other relevant factors in terms of their impact on economic growth of the V4 countries. We have used model tools and information sources that have been applied in the majority of published and analyzed articles. Adopting this approach, we intend to eliminate the impact of different methodologies in quantitative analysis and to increase the comparative weight of our results.

6. Methodological framework

The impact of remittance inflows and other selected factors on economic dynamics is estimated through the GDP per capita volume and the GDP per capita growth.

The general econometric model on basis of which we analyze the dependency in question takes the form of the following:

$$Yi = \alpha + \sum_{j=1}^{n} \beta i X i + u = \alpha + \beta 1 * X1 + \beta 2 * X2, ..., \beta n * Xn + u \qquad (1)$$

where **Y** is the studied dependent variable, **α, β1, …, βn** are the regression coefficients, and **u** is the expected estimation error.

Model (1) is analyzed in two alternatives, where variable **Y** presents the following:
- Alternative A—Volume of GDP per capita   labelled as **GDPpc**
- Alternative B—Annual growth of GDP per capita   labelled as **GDPpc-G**

As explanatory factors, or independent variables, according to earlier conducted theoretical studies and experimental recounts, we have defined the following:

Factors	Variable	Label
1. Volume of inflowed remittances as % GDP	- REMIN	X1
2. Volume of inflowed remittances-lagged as % GDP	- REMIN-1	X1-1
3. Volume of outflows of remittance as % GDP	- REMOUT	X2
4. Export as % GDP	- EXPORT	X3
5. Import as % GDP	- IMPORT	X4
6. Direct foreign investment as % GDP	- FDI	X5
7. Total capital formation as % GDP	- GCF	X6
8. Total volume of final consumption as % GDP	- FINCONSUM	X7
9. Volume of international trade as % GDP	- TRADE	X8
10. Population growth in % annually	- POPUL-G	X9
11. Government debt as % GDP	- DEBT	X10

To eliminate the heteroscedasticity in values of dependent variables, we have used their log transformed values as follows:

- GDPpc   - new value   - **LN(GDPpc)**

The values of all explanatory variables are applied in their relative values toward the national GDP.
The values reflecting annual growth of GDPpc-G are presented in their relative values (%) toward the previous year.

The relevant statistical information for the V4 countries for period 2000–2018 is transformed into panel data, in which the specificities of each country are represented by sectoral, time invariant variables labelled as Czechia, Hungary, Poland, and Slovakia.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

On basis of an analysis of previous economic developments, the significant impact of the economic recession on individual national economies has been identified in the countries concerned in 2009 and 2010. To quantify this impact, we expanded the list of time invariant explanatory variables labelled as Crisis09 and Crisis10.

Having in mind the above presented clarification, the econometric model for estimating the theoretical values of the statistically dependent variable LN(GDPpc) and GDPpc-G has the following form:

For dependent variable LN(GDPpc):

$$LN(GDPpc) = b1*REMIN + b2*REMIN-1 + b3*REMOUT + b4*EXPORT + b5*IMPORT + b6*FDI + b7*GCF + b8*FINCOMSUM + b9*TRADE + b10*POPUL + b11*DEBT + u \qquad (2)$$

For dependent variable GDPpc-G:

$$GDPpc-G = b1*REMIN + b2*REMIN-1 + b3*REMOUT + b4*EXPORT + b5*IMPORT + b6*FDI + b7*GCF + b8*FINCOMSUM + b9*TRADE + b10*POPUL + b11*DEBT + u \qquad (3)$$

Consequently, we verified the applicability of both models to estimate the impact of remittance flows on macroeconomic indicators LN(GDPpc) and GDPpc-G. This means that we should verify the validity of the following hypotheses:

H1: Variable REMIN has a statistically significant impact on LN(GDPpc)
H2: Variable REMIN has a statistically significant impact on GDPpc-G

As a methodological tool to answer the above presented hypotheses, we applied the pooled regression models with the fixed effects.

As a final test for evaluating the impact of remittance inflows on economic growth, the Granger causality test was employed. According the EViews approach, this test is based on bivariate regression of the following form:

$$LN(GDPpc)t \quad = Yt = \alpha o + \alpha 1*Yt-1+...+ \alpha l*Yt-l + \beta 1*Xt-1+...+ \beta l*Xt-l + ut \qquad (4)$$
$$REMINt \qquad = Xt = \alpha o + \alpha 1*Xt-1+...+ \alpha l*Xt-l + \beta 1*Yt-1+...+ \beta l*Yt-l + ut \qquad (5)$$

where Yt and Xt correspond to variables LN(GDPpc)t and REMINt .

In the above formulated model (4), the Xt (REMIN) does not Grenger-cause Yt (GDPpc) only if all βj=0. Reciprocally, in model (5), the Yt (GDPpc) does not Grenger-cause Xt (REMIN) only if all βj=0.
Testing procedure was performed by EViews software package.

7. Data, results, and discussion

All input data are drawn from the World Bank, the International Organization for Migration, Eurostat, and the UN OpenData sources. The time series data of the relevant indicators for the 2000–2018 period is presented in Table 1.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Table 1 Original data for Czechia, Hungary, Poland and Slovakia for 2000-2018

					Original input data							
LN(GDP)	LN(GDPpc)	GDPpc G	REM-IN	REM-OUT	Export % GDP	Import % GDP	FDI % GDP	GCForm % GDP	FCONSUMP % GDP	TRADE % GDP	POPUL % Growth	DEBT % GDP
11,89	9,56	4,56	0,48	0,36	48,19	50,04	45,50	31,41	50,57	88,32	-0,28	17,00
11,96	9,63	3,30	0,38	0,40	49,03	50,28	47,54	31,55	49,88	94,81	-0,38	22,80
11,98	9,66	1,85	0,41	0,48	45,12	46,40	48,26	30,13	49,86	95,50	-0,19	25,90
12,03	9,71	3,63	0,50	0,56	46,91	48,11	50,00	29,04	49,90	96,49	-0,03	28,30
12,10	9,78	4,87	1,03	0,68	57,34	56,53	52,30	29,35	48,86	95,44	0,03	28,50
12,16	9,83	6,39	0,98	0,60	62,18	59,83	44,51	29,12	47,85	95,67	0,14	27,90
12,21	9,88	6,56	1,03	0,69	65,19	62,45	51,35	30,04	46,97	96,04	0,27	27,70
12,31	9,98	4,99	0,97	0,85	66,41	63,96	59,40	32,07	46,06	94,96	0,58	27,50
12,34	9,99	1,83	0,48	0,89	63,23	61,06	48,01	31,06	47,37	94,15	0,57	28,30
12,30	9,95	-5,34	0,58	0,71	58,68	54,81	61,03	26,51	48,61	93,85	0,57	33,60
12,31	9,96	1,98	0,59	0,52	66,03	62,94	61,94	27,12	48,96	94,66	0,29	37,40
12,34	9,99	1,57	0,61	0,50	71,31	67,48	52,89	26,96	49,05	95,80	0,21	39,80
12,35	10,00	-0,94	0,68	0,44	76,17	71,37	65,82	26,19	49,21	96,79	0,14	44,50
12,37	10,02	-0,52	0,83	0,34	76,87	71,11	64,03	24,67	49,41	104,00	0,03	44,90
12,43	10,08	2,61	1,26	0,45	82,55	76,18	58,47	25,88	48,07	104,70	0,11	42,20
12,50	10,14	5,10	1,43	0,39	81,05	75,05	62,42	27,96	46,83	105,09	0,20	40,00
12,51	10,15	2,25	1,60	0,45	79,56	71,84	62,46	25,98	47,04	104,63	0,19	36,80
12,56	10,20	4,08	1,66	0,51	79,73	72,20	72,25	25,87	47,42	103,49	0,27	34,70
12,60	10,24	2,65	1,60	0,65	78,39	72,00	66,59	26,17	47,48	103,49	0,29	32,60
11,57	9,25	4,75	0,47	0,07	66,86	70,55	69,05	28,06	54,43	96,13	-0,26	55,00
11,67	9,35	4,31	0,45	0,07	64,88	66,17	69,59	26,24	53,97	98,45	-0,23	51,60
11,75	9,43	5,04	0,34	0,07	58,14	60,18	70,08	25,60	54,58	100,09	-0,28	54,80
11,80	9,48	4,38	0,29	0,07	56,33	60,27	70,39	24,61	56,32	102,22	-0,29	57,40
11,84	9,53	5,06	1,61	0,50	59,65	63,61	70,68	26,88	55,02	95,95	-0,22	58,30
11,89	9,58	4,45	1,69	0,53	62,64	64,95	54,06	25,32	54,82	96,26	-0,20	60,20
11,94	9,63	4,19	1,79	0,53	73,87	75,00	69,54	25,79	53,32	96,09	-0,16	64,40
11,97	9,66	0,40	1,65	0,71	77,94	77,40	68,26	24,28	54,37	96,17	-0,15	65,30
12,01	9,71	1,24	1,59	0,73	79,28	78,92	55,75	24,62	53,62	96,04	-0,18	71,20
11,97	9,66	-6,55	1,34	0,58	74,40	70,37	75,73	20,26	53,63	96,25	-0,15	77,50
12,01	9,71	0,89	1,58	0,53	81,75	76,45	69,52	20,60	52,53	97,08	-0,23	80,20
12,06	9,76	2,11	1,97	0,52	86,59	80,47	60,81	20,39	52,78	96,80	-0,28	80,50
12,06	9,77	-0,96	2,75	0,47	86,32	79,55	81,65	19,33	53,83	98,06	-0,32	78,40
12,09	9,80	2,24	3,40	0,35	85,58	78,59	80,72	20,92	52,32	104,72	-0,28	77,10
12,14	9,85	4,48	3,39	0,35	87,42	81,07	71,68	23,44	50,15	104,19	-0,27	76,60
12,19	9,90	4,09	3,72	0,26	87,98	79,99	70,08	23,30	48,90	103,03	-0,24	76,70
12,18	9,89	2,50	3,83	0,30	87,15	78,40	65,63	21,32	49,80	102,71	-0,30	76,00
12,21	9,93	4,60	3,43	0,32	87,14	79,85	66,90	22,85	49,52	103,49	-0,27	73,40
12,27	9,99	5,30	3,08	0,34	84,94	80,57	61,12	27,23	48,70	103,49	-0,20	70,80
12,79	9,14	5,66	0,87	0,08	27,23	33,56	36,94	24,63	63,63	100,10	-0,03	36,40
12,82	9,17	1,28	0,82	0,08	27,23	30,85	37,51	20,56	64,40	101,63	-0,03	37,10
12,87	9,22	2,09	0,85	0,08	28,76	32,17	38,42	18,45	66,33	103,79	-0,05	41,50
12,89	9,25	3,63	1,05	0,07	33,39	36,05	38,95	18,83	64,92	105,70	-0,07	46,30
12,97	9,33	5,20	1,85	0,13	34,26	36,95	40,64	20,23	64,17	97,55	-0,06	45,10
13,02	9,38	3,54	2,11	0,12	34,61	35,67	28,20	19,91	62,85	99,58	-0,04	46,40
13,08	9,43	6,25	2,46	0,12	37,86	39,93	33,59	21,70	61,89	98,65	-0,06	46,90
13,18	9,53	7,09	2,44	0,16	38,56	42,10	38,31	25,21	60,22	98,08	-0,05	44,20
13,22	9,58	4,24	1,96	0,21	37,86	42,90	27,80	24,66	61,78	97,15	0,01	46,30
13,23	9,58	2,75	1,86	0,16	37,18	38,04	38,06	20,57	61,58	96,24	0,07	49,40
13,33	9,67	3,90	1,60	0,16	40,06	42,05	39,14	21,31	61,57	95,94	-0,29	53,10
13,39	9,74	4,96	1,46	0,16	42,56	44,52	31,09	22,44	61,47	95,90	0,05	54,10
13,44	9,79	1,61	1,40	0,17	44,44	44,88	39,76	20,99	61,52	96,21	0,00	53,70
13,45	9,79	1,45	1,41	0,17	46,32	44,37	43,71	18,98	60,94	107,35	-0,06	55,70
13,48	9,84	3,40	1,36	0,22	47,57	46,13	38,86	20,36	60,02	106,90	-0,07	50,40
13,55	9,90	3,91	1,42	0,25	49,50	46,40	38,50	20,46	58,41	107,74	-0,07	51,30
13,55	9,90	3,11	1,42	0,35	52,19	48,16	39,56	19,59	58,48	108,60	-0,04	54,20
13,59	9,94	4,92	1,31	0,52	54,35	50,17	45,40	19,82	58,34	109,93	0,01	50,60
13,64	9,99	5,14	1,20	0,60	55,59	52,15	38,92	20,70	58,06	109,93	0,01	48,90
10,89	9,21	1,30	0,06	0,01	53,21	55,58	68,35	27,06	54,58	85,62	-0,14	49,60
10,97	9,29	3,44	0,07	0,02	57,12	64,56	67,53	30,65	55,90	86,03	-0,18	48,30
11,03	9,34	4,55	0,07	0,02	56,97	63,40	66,80	30,09	55,97	87,94	-0,04	42,90
11,08	9,39	5,57	0,91	0,02	62,33	62,81	66,18	25,58	54,18	90,09	-0,07	41,60
11,14	9,46	5,30	1,22	0,03	69,05	70,60	65,27	26,75	55,98	92,57	-0,02	40,60
11,24	9,55	6,61	1,93	0,06	72,30	75,43	60,44	29,67	54,97	93,28	0,01	34,10
11,34	9,66	8,49	1,90	0,06	81,24	83,39	67,56	28,47	54,91	92,68	0,00	31,00
11,45	9,76	10,80	1,92	0,07	83,38	82,95	62,03	28,21	54,22	92,34	0,03	30,10
11,52	9,84	5,48	2,04	0,12	80,15	81,92	52,20	28,41	55,83	91,74	0,09	28,50
11,46	9,77	-5,58	1,88	0,11	68,04	68,20	59,07	20,50	59,67	91,68	0,13	36,30
11,55	9,86	5,62	1,76	0,05	77,32	77,63	56,23	23,87	57,19	92,26	0,09	41,20
11,57	9,89	2,73	1,77	0,05	85,01	84,31	52,94	25,24	55,71	92,60	0,13	43,70
11,61	9,92	1,72	2,04	0,11	91,04	85,52	59,00	20,67	56,07	92,60	0,17	52,20
11,62	9,93	0,56	2,10	0,12	93,62	88,01	58,92	20,92	55,49	90,82	0,11	54,70
11,66	9,97	2,65	2,37	0,14	91,52	86,70	49,27	21,75	55,07	90,68	0,10	53,50
11,71	10,02	4,72	2,42	0,15	92,02	88,95	52,43	24,26	54,05	90,98	0,10	52,20
11,65	9,96	1,99	2,36	0,14	93,73	90,78	52,97	23,05	55,08	91,25	0,13	51,80
11,67	9,98	2,88	2,27	0,15	95,11	92,92	62,24	23,03	55,87	91,07	0,16	50,90
11,72	10,03	3,89	2,00	0,21	96,09	94,06	54,89	23,43	55,93	91,07	0,14	48,90

Source: UN Open data, WB, IOM, Eurostat, the authors

The original data is organized in the form of a pooled panel data to sequence of Czechia, Hungary, Poland, and Slovakia. The sectorial, time invariant variables, Crise06 and Crise10, as well as the sectorial variables representing the individual countries of Czechia, Hungary, Poland, and Slovakia were added consequently. The descriptive statistics are presented in Table 2.

Table 2. Descriptive statistics of the original variables

Descriptive statistics												
PARAMETER	LN(GDPpc)	GDPpc G	REMITIN % GDP	REMITOUT % GDP	Export % GDP	Import % GDP	FDI % GDP	GCForm % GDP	FCONSUMP % GDP	TRADE % GDP	POPUL % Growth	DEBT % GDP
Valid cases	76	76	76	76	76	76	56	76	76	76	76	76
Mean	9.732	3.300	1.644	0.305	65.415	64.221	55.424	24.594	54.596	97.492	-0.030	48.283
Std. error of mean	0.031	0.317	0.120	0.027	2.205	1.938	1.750	0.421	0.593	0.658	0.029	1.757
Variance	0.072	7.657	1.088	0.054	369.613	285.391	171.578	13.497	26.690	32.942	0.063	234.542
Std. Deviation	0.268	2.767	1.043	0.233	19.225	16.894	13.099	3.674	5.166	5.740	0.252	15.315
Variation Coefficient	0.028	0.839	0.634	0.763	0.294	0.263	0.236	0.149	0.095	0.059	-8.479	0.317
Skew	-0.463	-1.138	0.472	0.595	-0.273	-0.268	-0.290	0.191	0.305	0.298	-0.107	0.430
Kurtosis	-0.567	3.415	-0.556	-0.693	-0.991	-0.970	-0.515	-0.974	-0.702	-0.522	4.094	-0.311
Minimum	9.138	-6.555	0.061	0.013	27.229	30.845	27.801	18.445	46.061	85.617	-1.044	17.000
Maximum	10.240	10.800	3.828	0.894	96.090	94.065	81.654	32.072	66.332	109.934	0.829	80.500
Range	1.102	17.355	3.767	0.882	68.861	63.219	53.854	13.627	20.272	24.316	1.874	63.500
Sum	739.62	250.80	124.96	23.20	4,971.55	4,880.79	3,103.75	1,869.13	4,149.27	7,409.38	-2.26	3,669.50
5th percentile	9.219	-1.619	0.259	0.020	32.696	35.350	30.659	19.281	47.026	88.261	-0.307	27.260
10th percentile	9.319	0.513	0.369	0.055	37.655	39.362	38.236	20.133	47.737	90.932	-0.284	28.300
25th percentile	9.556	1.980	0.629	0.107	49.145	48.629	44.735	20.924	49.817	92.833	-0.195	36.875
Median	9.773	3.759	1.613	0.236	66.219	65.559	58.694	24.644	54.578	96.227	-0.032	47.600
75th percentile	9.946	4.981	2.084	0.509	81.623	78.546	65.232	27.107	58.268	102.951	0.107	54.775
90th percentile	10.018	5.834	3.396	0.660	88.896	84.672	70.562	30.056	61.814	105.271	0.224	76.180
95th percentile	10.140	6.685	3.719	0.717	93.632	89.222	76.478	31.114	64.207	107.872	0.336	77.635

Source: World Bank, the authors

To assess the mutual relation among the variables that were analyzed, their partial correlation coefficients have also been calculated, as presented in Table 3.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Table 3. Coefficients of partial correlation, Pearson

Pearson correlation coefficients												
	LN(GDPpc)	GDPpc G	REMIT IN	REMIT OUT	Export	Import	FDI	GCForm	FCONSUMP	TRADE	POPUL	DEBT % GDP
LN(GDPpc)	1											
GDPpc G	-0,157	1										
REMIT IN	0,473	0,068	1									
REMIT OUT	0,490	-0,255	-0,001	1								
Export	0,631	-0,108	0,350	0,161	1							
Import	0,529	-0,052	0,273	0,079	0,984	1						
FDI	0,325	-0,287	-0,021	0,283	0,774	0,733	1					
GCForm	0,024	0,327	-0,532	0,256	0,089	0,159	0,175	1				
FCONSUMP %	-0,590	0,071	0,080	-0,624	-0,594	-0,542	-0,662	-0,615	1			
TRADE	0,218	0,025	0,444	0,210	-0,178	-0,292	-0,054	-0,445	0,061	1		
POPUL	0,532	-0,130	-0,095	0,317	0,186	0,151	-0,159	0,224	-0,303	-0,151	1	
DEBT	0,010	-0,246	0,528	-0,013	0,342	0,309	0,315	-0,583	0,095	0,263	-0,449	1

Source: World Bank, the authors

Particular interest is focused on the values of correlation coefficients between the dependent variables LN(GDPpc) and the core studied explanatory variables of REMIN and REMOUT. Figure 1 presents the linear regressions between these variables under the pooled panel data scheme.
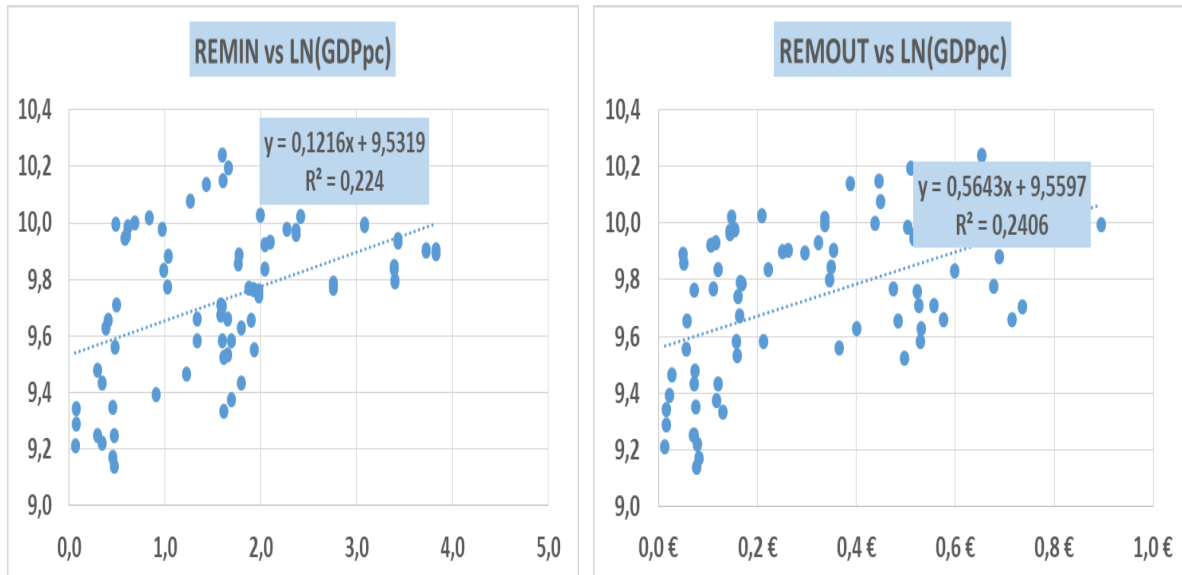
Fig. 1. Linear regression between LN(GDPpc) and REMIN, REMOUT
Source: World Bank, the authors
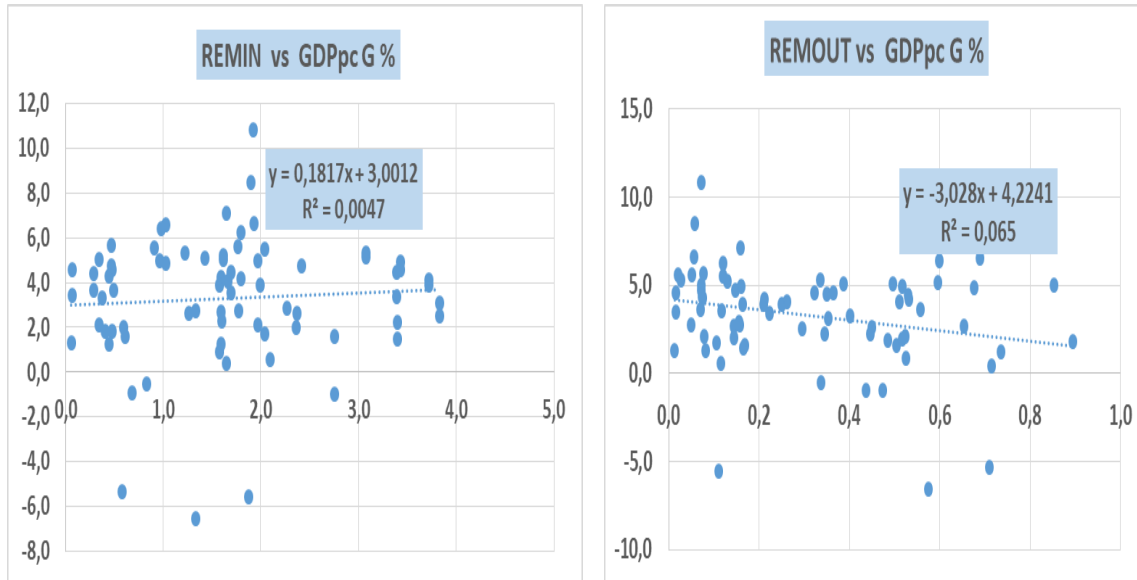
Fig. 2. Linear regression between LN(GDPpc-G) and REMIN, REMOUT
Source: World Bank, author

As expected, the analysis of data in the pooled form, without respecting the sectoral time invariant factors, demonstrates relatively low correlation ties (see Figure 2). However, a significantly different situation is presented if the data is analyzed for individual countries, as demonstrated in Figure 3.
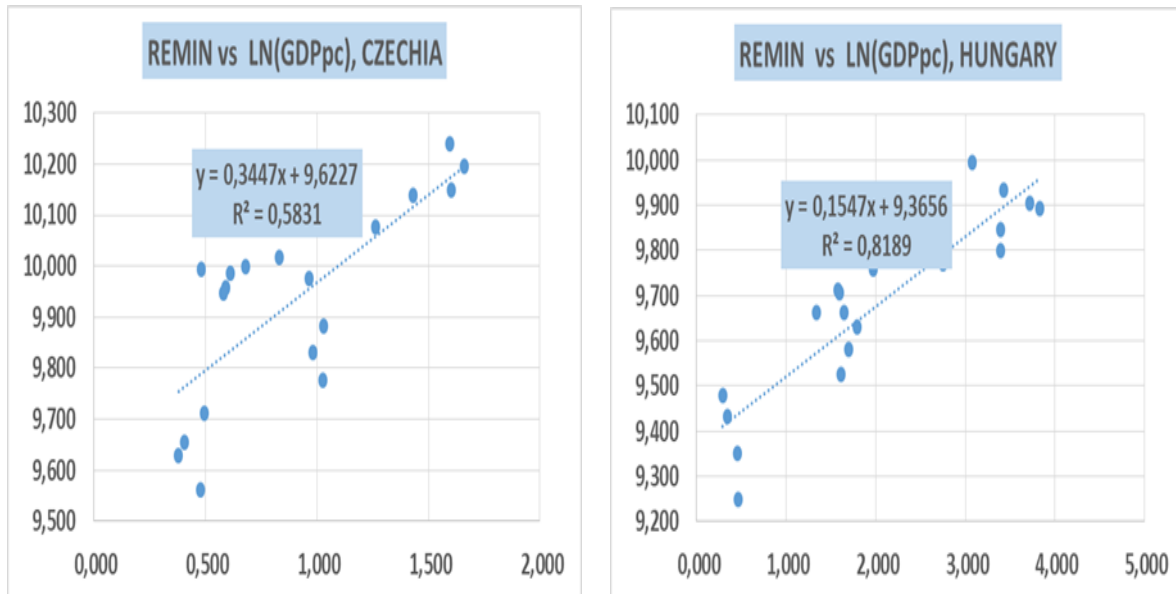
Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
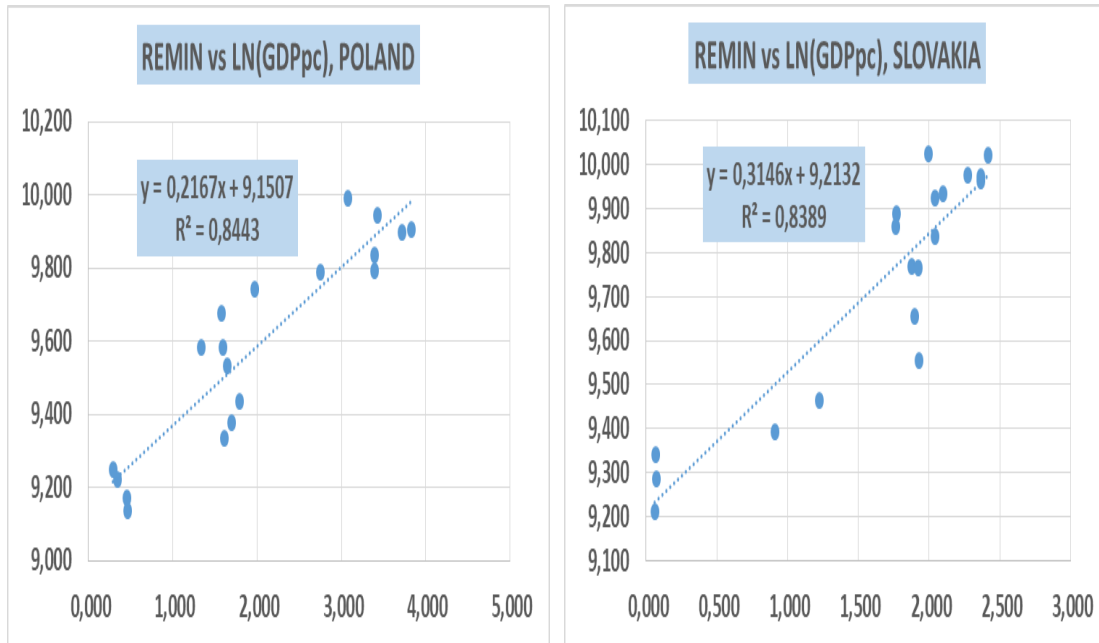
Figure 3. Linear regression between LN(GDPpc) and REMIN for individual countries
*Source: W*orld Bank, the authors

The last figures present the need to adopt the panel data approach, with sectoral variables reflecting the country specificities.

With reference to the published findings, specifically those of Aldrich (37), Aisbett (38), Kahn (39), Panizza (41), neither high nor statistically significant values of the correlation indicators do not confirm the causal relationship among the considered variables. They only reflect their correlation closeness and this should be respected in interpretation of the results of following statistical analysis.

8. Remittances as a factor of economic growth in the V4 countries

In line with the methodology of this paper, the main factors to further monitor the volume and growth of gross domestic product per capita are the following independent variables:
- The inflow of remittances into V4 countries
- The outflow of remittances from V4 countries

According the officially reported data presented in Table 4, more than USD 613 billion was redistributed worldwide in 2017, which confirms the significance of monitoring and analyzing the remittance flows.

The total EU transfers amounted to USD 147 billion in 2017, of which USD 77 billion were directed to non-member countries, particularly to the low-income developing countries.

Table 4. Remittance flows between EU and non-EU countries

Remittance flows between EU and Non-EU countries			
Volume of remittance flows 2017, mil USD			
	EU	NON EU	Spolu
EU	70 290	77 691	147 981
NON EU	53 989	411 494	465 483
Total	124 279	489 185	613 464
Share of remittance flows, 2017, %			
	EU	NON EU	Spolu
EU	11,46	12,66	24,12
NON EU	8,80	67,08	75,88
Total	20,26	79,74	100

Source: World Bank, the authors

To clarify the current situation related to remittance flows and their expected positive impact on economic growth in selected EU countries, we present the statistical data on remittance inflows in the V4 countries for the 2000–2018 period, Figure 4a.
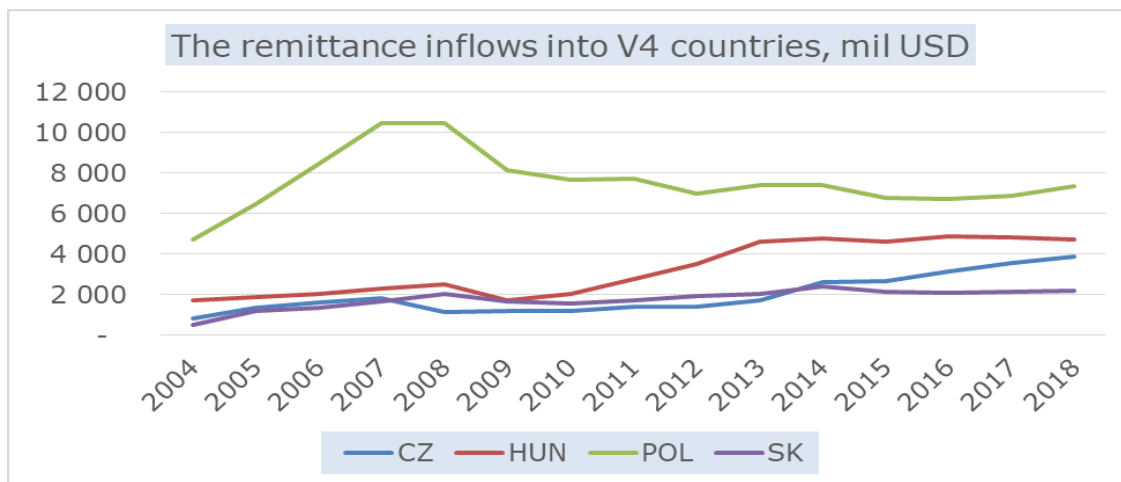
Fig. 4. Inflows of remittances into V4, mil. USD
Source: IOM, the authors

The highest share of remittances gained (as % of GDP) among the V4 countries was Hungary (3%), while the share of Slovakia´s remittances reached 2.1%. In Czechia and Poland, where labor markets have not been severely weakened over the studied period, the share of remittances was slightly lower with 1.6% and 1.3%, respectively.

Concerning the final destination of these finances, the households in Slovakia received total transfers in 2018 of more than USD 2.21 billion, and since 2004, the total was over USD 26 billion. Of this amount, more than 87% were transfers from EU countries, mainly the UK, Czechia, Germany, and Austria.

The V4 countries, as an organic part of the European Union's economic and social space, also created a wide scope for a foreign labor force that involves the subsequent financial compensation of foreign workers in the form of remittance outflows, as presented in Figure 4b.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
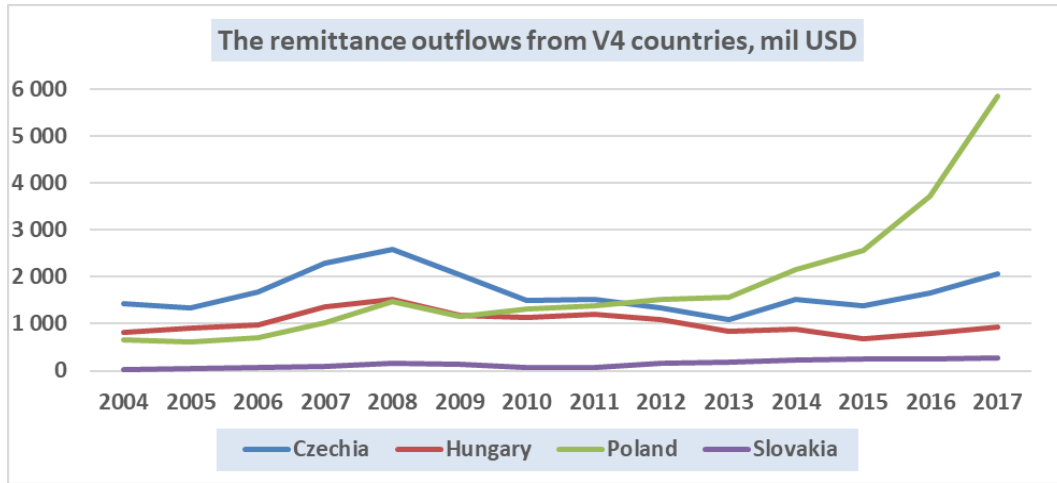
Fig. 4b. The remittance outflows from V4 countries, mil. USD
Source: IOM, the authors

The volume of outflow remittances was significantly lower than the volume of remittances received. In 2018, the volume of remittance paid in Czechia was USD 2.758 billion, USD 1.011 billion in Hungary, USD 7.094 billion in Poland, and USD 0.385 billion in Slovakia. In these countries, the share of the disbursement paid was 1.13% in Czechia, 0.656% in Hungary, 1.211% in Poland, and only 0.361% in Slovakia. The total volume of remittances paid in Slovakia for the entire period of 2000–2018 amounted to USD 2.3 billion.

The growth of the GDP per capita and the volume of remittance per capita is presented in Figure 5. While the development of GDPpc in the V4 countries follows a similar mode in economic growth with the leading position of Czechia and Slovakia, the inflows of remittances in these countries indicates a different pattern with leading positions for Hungary and Slovakia.
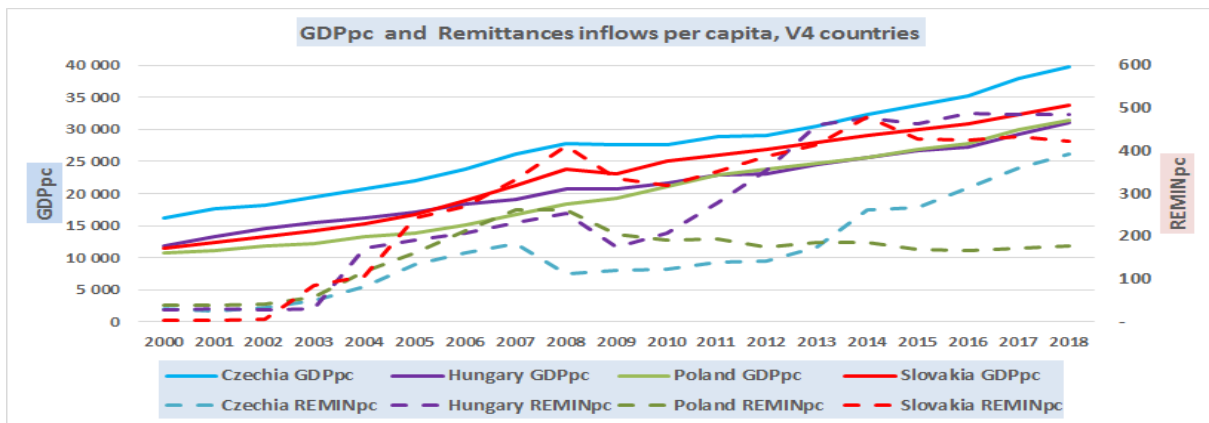
Fig. 5. Dynamics of GDPpc and the remittances received per capita
Source: IOM, the authors

9. Solution of econometric models (2) and (3)

To confirm the initially formulated hypotheses H1 and H2, the models (2) and (3) and their solutions are presented. The dependent variables LN(GDPpc) and GDPpc-G are expressed through the set of explanatory variables defined earlier. The solutions of these models are presented under three scenarios and two forms.

The first scenario offers the pooled linear regression for estimating dependent variable LN(GDPpc). The explanatory variables are presented in Table 1.

Under the second scenario the dependent variable is estimated through expanded list of explanatory variables, where the time invariant variables representing individual countries are taken into account.

The third scenario considers also the expected external impact of economic crisis in 2009 and 2010 toward all studied countries.
All solution are presented in two form A and B. The form A contains all explanatory variables, while the form B contains only a list of statistically significant variables with p < 0.05 (see Table 5).

Table 5. Model (2)

Table 5	Solutions to Model 2											
	Y = LN (GDPpc)											
	Pooled regression				Expanded model - Countries				Expended model - Crisis			
	A		B		A		B		A		B	
	Coefficient	P	Coefficient	P	Coefficient	P	Coefficient	P	Coeff.	P	Coeff.	P
Constant	9,163	0,000	8,235	0,000	9,273	0,000	9,053	0,000	4,602	0,012	8,620	0,000
REMIN	0,013	0,601			0,089	0,005	0,086	0,000	0,147	0,000	0,125	0,000
REMOUT	0,021	0,827			0,023	0,825			0,097	0,278		
EXPORT	0,022	0,262	0,025	0,000	-0,024	0,272			0,021	0,295		
IMPORT	-0,016	0,437	-0,018	0,004	0,037	0,111	0,016	0,000	-0,001	0,942	0,020	0,000
FDI	-0,004	0,046	-0,004	0,011	-0,001	0,635			-0,004	0,009	-0,003	0,025
GCFORM	-0,009	0,652			-0,039	0,105	-0,011	0,006	0,021	0,383		
FCONSUM	-0,007	0,729			-0,035	0,194			0,037	0,181		
TRADE	0,011	0,015	0,013	0,000	0,001	0,792			0,001	0,751		
POPUL	0,334	0,005	0,454	0,000	0,295	0,009	0,375	0,000	0,221	0,025	0,275	0,000
DEBT	-0,003	0,119			0,000	0,899			0,000	0,943		
CZECHIA					2,481	0,000			1,539	0,000		
HUNGARY					2,102	0,000	-0,384	0,000	0,998	0,026	-0,464	0,000
POLAND					2,534	0,000			1,237	0,023		
SLOVAKIA					2,155	0,000	-0,476	0,000	0,829	0,071	-0,580	0,000
Crisis 09									0,212	0,000	0,192	0,000
Crisis 10									0,171	0,000	0,147	0,000
R^2	0,838		0,827		0,899		0,886		0,936		0,926	

Source: IOM, the authors

Concerning the impact of remittance inflows, the variable REMIN is statistically significant according several versions of model (2). The highest level of reliability in explaining variability of dependent variable LN(GDPpc) is presented by Expanded model with time invariant variables representing individual countries and crises. The respective index of determination has a value of R2=0.936. The robustness of the model is presented by empiric and estimated time series data of LN(GDPpc), according the last presented model, Figure 6.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
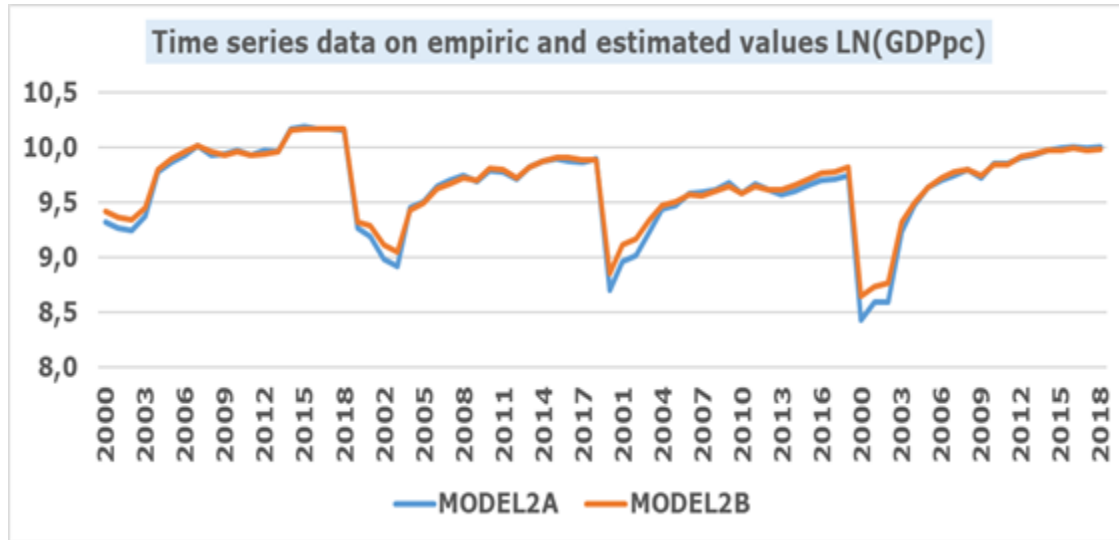
**Fig. 6.** The empiric and estimated values of LN(GDPpc)
Source: the authors

The time-invariant sectoral and country related variables for Hungary = -0.3711 and Slovakia = -0.4356 indicate a fairly strong effect on the nationally specific factors to transfer the remittance inflows into economic growth. To identify them, the additional variability analysis of the values LN(GDPpc) would be required by introducing the relevant "hedonic variables."

Table 6. Model (3)

Table 6	Solutions to Model 3											
	Y = GDPpc - G											
	Pooled regression				Expanded model - Countries				Expanded model - Crisis			
	A		B		A		B		A		B	
	Coefficient	P	Coefficient	P	Coefficient	P	Coefficient	P	Coeff.	P	Coeff.	P
Constant	-97,485	0,010	-42,340	0,000	30,837	0,476	-42,340	0,000	96,618	0,028	-21,905	0,001
REMIN	0,685	0,224	2,113	0,000	-0,536	0,479	2,113	0,000	-1,373	0,048		
REMOUT	0,574	0,787			-3,866	0,148			-5,938	0,009		
EXPORT	1,015	0,025			0,253	0,633			-0,296	0,542		
IMPORT	-0,982	0,034			-0,036	0,949			0,415	0,406		
FDI	-0,103	0,013			-0,083	0,051			-0,026	0,493		
GCFORM	1,824	0,000	0,967	0,000	0,485	0,415	0,967	0,000	-0,460	0,425	0,537	0,000
FCONSUM	0,997	0,022	0,331	0,000	-0,621	0,357	0,331	0,000	-1,556	0,022		
TRADE	0,037	0,707			-0,088	0,446			-0,074	0,423	0,184	0,000
POPUL	-8,789	0,001			-6,081	0,029			-1,954	0,400		
DEBT	-0,024	0,573			-0,261	0,008			-0,316	0,000	-0,083	0,000
CZECHIA					-0,414	0,965			12,094	0,184	-5,378	0,000
HUNGARY					9,807	0,367			27,426	0,012		
POLAND					18,124	0,182			35,649	0,008		
SLOVAKIA					3,320	0,750			21,449	0,054		
Crisis 09									-5,385	0,000	-5,502	0,000
Crisis 10									0,337	0,728		
R^2	0,7064		0,5309		0,7748		0,5309		0,8634		0,7267	

Source: author

All solutions to Model 3 (see Table 6) demonstrate slightly lower degrees of coherence among the empiric and estimated data. Total variability in GDPpc-G values is covered by the identified explanatory variables to maximum at 86% (respectively 77%). The empiric and estimated time series of GDPpc-G are presented on Figure 7.
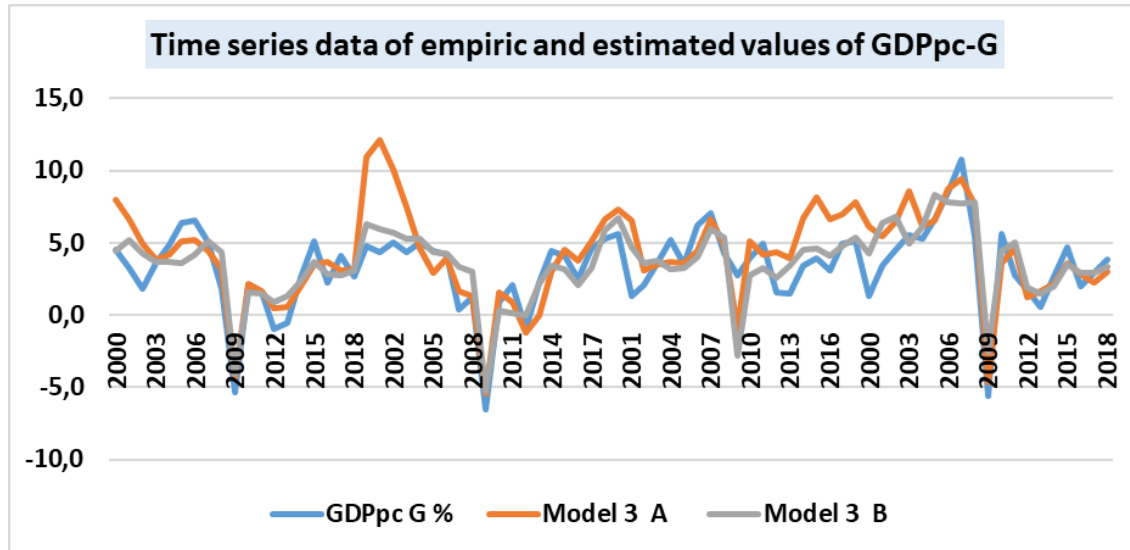
Fig. 7. Time series of empiric and estimated values for Models 2A and 2B
Source: the authors

Based on the results of all presented models, the statistically significant impact of the remittance inflows on GDPpc volume and GDPpc-G growth of hosting countries was identified by both econometric models. Results obtained by these econometric models could be accepted as a confirmation of the working hypotheses, H1 and H2. In the economic interpretation, this finding means that remittance inflows in the Visegrad group countries (V4) during the period 2000–2018 had positive impact on economic growth measured by volume of GDPpc as well as on annual growth of GDPpc.

10. Granger causuality approach

The last step in evaluating the importance and validity of the impact of remittance inflows is the Granger causality test between variables LN(GDPpc) and REMIN and LN(GDPpc-G) and REMIN. The results are presented below in Table 7:

Table 7. Results of Granger Causality Testing for Model 2

Pairwise Granger Causality Tests Date: 06/30/20 Time: 23:15 Sample: 1 76 Lags: 2			
Null Hypothesis:	**Obs**	**F-Statistic**	**Prob.**
REM-IN does not Granger Cause LN(GDPpc)	**74**	**1.29680**	**0.2800**
LN(GDPpc) does not Granger Cause REM-IN		**4.05072**	**0.0217**

Source: Eviews, author

According the results above, we cannot reject the hypothesis that REM-IN does not Granger cause LN(GDPpc); however, we reject the hypothesis that LN(GDPpc) does not Granger cause REM-IN. This indicates that the Granger causality runs in the direction from LN(GDPpc) to REM-IN (see Table 8).

Table 8. Results of Granger Causality Testing for Model 3

Pairwise Granger Causality Tests Date: 06/30/20 Time: 23:31 Sample: 1 76 Lags: 2			
Null Hypothesis:	**Obs**	**F-Statistic**	**Prob.**
REM-IN does not Granger Cause LN(GDPpc-G)	**74**	**1.02770**	**0.3632**
LN(GDPpc-G) does not Granger Cause REM-IN		**0.83185**	**0.4396**

Source: the authors

In the case of Model 3, we cannot reject neither of the two hypotheses.

These findings are in line with the previous conclusions about the impact of remittance inflows obtained by econometric models (2) and (3).

All the results of the above presented econometric analysis and the Granger causality tests offer qualified information about the ties among the studied variables. However, the presented results have only partially confirmed the positive impact of remittance inflows on economic growth in the studied countries. Despite the high value of the obtained information, the final interpretation of the results, namely their transformation into terms of causality, should be considered in the context of all the relevant economic and social dimensions.

Conclusions

The worldwide globalization of economies, their technological openness, and their interconnection also amplifies the national labor markets and consequently, the migration of workers from less developed countries into labor markets that offer higher compensations. These financial means or remittances are private incomes of individual workers. However, because of their high volumes, these means are considered as a possible source of economic growth of national economies of the mother countries. For this reason, remittance flows between the hosting and the mother countries of foreign workers has been a frequently discussed topic in professional literature.

The main goal of our discussion was to answer the research questions that were formulated through the two working hypotheses. As a methodological tool, we adopted the panel data analysis supported by econometric model techniques and Granger causality testing.

On the basis of the statistical information obtained, formulating the following positions on the working hypotheses is possible:

Hypothesis 1:
A statistically significant impact of remittances received on the volume of LN(GDPpc) **has been confirmed** based on Models 2A and 2B.

Hypothesis 2:
A statistically significant impact of the remittances received on the growth of GDPpc-C has not been confirmed based on Models 3A and 3B.

We consider that all the above findings should be interpreted as results based on the correlation and regression relationships, which **do not provide sufficient arguments to confirm the generally valid positive causal relationship** between the remittance received and the dynamics of the GDP in case of the four Visegrad group countries.

References

Adams, S., Mensah, Klobodub, E., K. 2016. Remittances, regime durability and economic growth in Sub-Saharan Africa (SSA). Economic Analysis and Policy, 50, 1-8. https://doi.org/10.1016/j.eap.2016.01.002. ISS 0313-5926

Aldrich, J. 1995. Correlation and Spurious Regression in Pearson and Yule, Statistical Science, 10(4), 364-376**.** ISSN**:** 0883-4237 (print), 2168-8745 (electronic)

Alvarez, S., P., et al. 2015. Remittances: How reliable are the data?. Migration Policy Practice
https://publications.iom.int/system/files/pdf/mpp_issue_21.pdf,

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Azam, M., Haseeb, M., Samsudin, S. 2016. The Impact of Foreign Remittances on Poverty Alleviation: Global Evidence, Economics and Sociology, 9(1), 264-281. https://doi.org/10.14254/2071-789X.2016/9-1/18 ISSN 2071-789X

Barajas, A., at all. 2009. Do Remittances Promote Economic Growth? IMF, July 2009. https://books.google.sk/books?hl=sk&lr=&id=JQSXlKd1ZDUC&oi=fnd&pg=PA3&dq=Do+Remittances+Promote+Economic+Growth%3F+IMF,&ots=vrxUhGf0_Y&sig=AIAVZxLwkl0FI2SR25vJFy2WZo4&redir_esc=y#v=onepage&q=Do%20Remittances%20Promote%20Economic%20Growth%3F%20IMF%2C&f=false

Berdiev, A., N. et all. 2013. Remittances and corruption, Economics Letters journal, 118(1), 182-185. ISSN 0165-1765.

Berwick, M. 2017. When Is Correlation Causation? Journal of National Cancer Institute, 109(8), djx087, https://doi.org/10.1093/jnci/djx087 ISSN 0027-8874, EISSN 1460-2105.

Bleske-Rechek, K. M., Heidke, L. 2015. Causal Inference from Descriptions of Experimental and Non-Experimental Research: Public Understanding of Correlation-Versus-Causation, The Journal of General Psychology, 142(1), 48–70. ISSN: 0022-1309 Online ISSN: 1940-0888

Castelli, F. 2018. Drivers of migration: why do people move?, Journal of Travel Medicine, 25(1) tay040, https://doi.org/10.1093/jtm/tay040

Chami, R. 2018. Is There a Remittance Trap?, Finance and Development, IMF.

Cismas, M., et all. 2019. The impact of remittances on the receiving country: some evidence from Romania in European context, Ekonomska Istraživanja / Economic Research, 2019 https://doi.org/10.1080/1331677X.2019.1629328 Print ISSN: 1331-677X Online ISSN: 1848-9664

Clemens, M., McKenzie, D. 2018. Why Don't Remittances Appear to Affect Growth?,The Economic Journal, 128(612), F179–F209, https://doi.org/10.1111/ecoj.12463 ISSN:1468-0297

Comes, C-A., Bunduchi, E., Vasile, V., Stefan, D. 2018. The Impact of Foreign Direct Investments and Remittances on Economic Growth: A Case Study in Central and Eastern Europe https://www.mdpi.com/2071-1050/10/1/238/pdf ISSN 2071-1050

Consumer Financial Protection Bureau.2020, http://www.consumerfinance.gov/

Coulibaly, D. 2015. Remittances and financial development in Sub-Saharan African countries: A system approach, Economic Modelling, 249-258. https://doi.org/10.1016/j.econmod.2014.12.005 ISSN: 0264-9993

Demirguc-Kunt, A., Ozden, C. 2019. Migration Trends in Europe and Central Asia, https://blogs.worldbank.org/peoplemove/migrationtrends-and-policies-europe-and-central-asia

Filipek, K., Polkowska, D. 2019. The Latent Precariousness of Migrant Workers: a Study of Ukrainians Legally Employed in Poland. Migration & Integration 21, 205–220 (2020). https://doi.org/10.1007/s12134-019-00708-6

Guterres, A. 2018. Towards a new global compact migration, UN. https://www.un.org/sg/en/content/sg/articles/2018-01-11/towards-newglobal-compact-migration

Hendrick, M., Bartram, D. 2019. Bringing Happiness Into the Study of Migration and Its Consequences: What, Why, and How?, Journal of Immigrant & Refugee Studies, 17, ISSN: 1556-2948 (Print) 1556-2956 (Online) Journal homepage: https://www.tandfonline.com/loi/wimm2

Hoerder, D. 2017. Introduction to the Special Issue on Migration in Slavic, Tsarist Russian and Soviet History, Journal of Migration History, https://doi.org/10.1163/23519924-00302001

https://www.imf.org/external/pubs/ft/fandd/2018/09/pdf/is-there-a-remittance-trap-chami.pdf

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

In: Drivers for Progress in the Global Society: The 3rd European Interdisciplinary Forum 2015, Vilnius June 18-19 2015. - Bologna: Medimond, 2015. - ISBN 978-88-7587-726-2. p. 55-66.

IOM: World Migration Report 2020, E-ISBN 978-92-9068-789-4, https://publications.iom.int/books/world-migration-report-2020

Kahn, R., Whited, T., M. 2018. Identification Is Not Causality, and Vice Versa, Review of Corporate Finance, Oxford University Press, 7(1), 1-21. ISSN 2046-9128, EISSN 2046-9136

Kosten, D.2018: International Migration Forum, Immigrants as Economic Contributors: They Are the New American Workforce, https://immigrationforum.org/article/immigrants-as-economic-contributors-they-are-the-new-americanworkforce/

Kováč, M. 2015. Citizens´ security as life quality development factor in selfgovernment regions. In: Drivers for Progress in the Global Society : The 3rd European Interdisciplinary Forum 2015, Vilnius June 18-19 2015. - Bologna : Medimond, 2015. - ISBN 978-88-7587-726-2. - S. 55-66.

Majeed, M., T. 2016. Migrant remittances and corruption: An Empirical Analysis, Pakistan Journal of Applied Economics, Applied Economics Research Centre, 26(1), 15-41, ISSN 2519-043

Meyera, D., Sherab, A. 2016. The impact of remittances on economic growth: An econometric model, EconomiA https://doi.org/10.1016/j.econ.2016.06.001 ISSN: 1517-7580

Muhammad, A., Sallahuddin, H., Khairuzzaman, K. 2013. Corruption, workers remittances, FDI and economic growth in five South and South East Asian countries: A panel data approach, Journal of Scientific Research, ISSN 1990-9233 http://www.idosi.org/mejsr/mejsr.htm

Nita, G. 2018. Remittances from Migrant Workers and their Importance in Economic Growth, International Journal of Academic Research in Accounting, Finance and Management Science http://dx.doi.org/10.6007/IJARAFMS/v8-i1/4041 ISSN: 2225-8329

OECD: Is Migration Good for Economy?, Migration Policy Debates, www.oecd.org/migtaion

Panizza, U., Presbytero, A. 2014. Public debt and economic growth: Is there a causal effect?, Journal of Macroeconomics, 41, 21-41. ISSN 0164-070

Penn Wharton University. 2016. The effects of Immigration on the United States´economy, https://budgetmodel.wharton.upenn.edu/issues/2016/1/27/the-effects-of-immigration-on-the-united-states-economym

Pooley, C. 2019. Newspaper Reporting of Migrants in England 1851–1911. 2019. Spatial and Temporal Perspective, Journal of Migration History https://brill.com/view/journals/jmh/5/1/article-p31_31.xml

Rauser, G., et al. 2018. Migrant remittances and their impact on the economic development of the Baltic States, Geographica Pannonica, ISSN 0354-8724 (hard copy) | ISSN 1820-7138 (online)

Simonescu, M. 2019. European economic integration and migration in Romania, Economic Research-Ekonomska Istraživanja, 32(1). 3607-3626, https://doi.org/10.1080/1331677X.2019.1674176 Print ISSN: 1331-677X Online ISSN: 1848-9664

Sobiech, I. 2019. Remittances, finance and growth: Does financial development foster the impact of remittances on economic growth?, ScienceDirect, 113, 44-59 https://doi.org/10.1016/j.worlddev.2018.08.016 ISSN: 0305-750X
Tyburski, M., D. 2014. Curse or Cure? Migrant remittances and corruption, The Journal of Politics, 76(3), 814-824. https://www.jstor.org/stable/10.1017/s0022381614000279, ISSN: 00223816, EISSN: 14682508

Vaysilova, E.,2019. Entrepreneurship and evaluation of entrepreneurial risk through the sensitivity analysis method, The 24th International Scientific Conference, Crisis situations solution in the specific environment, 22nd and 23rd may 2019, Zilina, Slovakia, ISBN 978-80-554-1559-8

World Bank. 2016. Migration and Remittances Factbook, e-ISBN: 978-1-4648-0320-8,

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

World Bank. 2016. Migration and Remittances, World Bank Group, www.KNOMAD.org

World Bank. 2019. Migration and Development Brief 31,

World Bank: Press Release 2019/148

Acknowledgements

Ladislav KABÁT. Professor, his field is social statistics and quantitative analysis with special interest in data collection, data processing and data quality. In past, he held positions - Director of Statistics Division of the FAO UN in Rome, Member of the EU Statistical Advisory Committee. Participated in various projects oriented on building and strenthening the statistical systems in developing countries.
Researcher ID: https://orcid.org/0000-0001-9459-7968
ORCID ID: https://publons.com/researcher/2505141/ladislav-kabat/

Ľuboš CIBÁK, Assoc. prof. Ing. PhD. MBA is Chairman of the Management Board of the School of Economics and Management in Public Administration in Bratislava, Slovak Republic and head of Department of the Managerial Informatics. His research and publication activities are focused on management, informatics systems, investment protection and business law.
ORCID ID: https://orcid.org/0000-0003-3881-7924

Stanislav FILIP, Assoc prof. Ing. PhD. is the Vice-Rector for foreign affairs an teacher of the School of Economics and management in Public Administration in Bratislava. His text books, monographs and scientific papers deal with the Risk and crisis managemtn in public sector, international crisis management and public administration at the national and EU level. He is succesfull leader and manager of the several scientific projects with support from the EU structural funds. He also organise and control international colaboration and Erasmus plus program with the high educational and research institutions in abroad.
Researcher ID: F-7984-2017
ORCID ID: https://orcid.org/0000-0003-3000-9383

IMPACT OF COVID-19 ON SMES AND EMPLOYMENT

Ahmad Al-Fadly

College of Business Administration, Gulf University for Science & Technology, Kuwait

E-mail: alfadly.a@gust.edu.kw

Abstract. COVID-19 is a highly infectious disease-causing serious health hazards and fatalities to humans around the world. The objective of this paper is to identify how COVID-19 caused immense failures to society, particularly Small-Medium Enterprises (SMEs) in the hospitality and tourism sectors which provide employment to many people. A literature review examined how preventive measures to control COVID-19 devastated businesses. The review highlighted particular interest to workforce, supply chain and cash flow of SMEs. This research addressed the gap in understanding what and how business was affected as seen by business owners. This research used phenomenology to study businesses crippled by the pandemic. Interviews were conducted with several business owners using a set of unstructured guiding questions. Verbal responses from the participants were transcribed to textual data and analyzed thematically. The results constructed a generalized perception of SME business owners and identified themes reflecting the business individual, the business, and business survival. Importantly, the study revealed several government actions are needed to support surviving businesses and revive lost businesses, specifically, in the form of stimulus funds, moratoriums, extended loans and waivers of interest.

1. Introduction

The pandemic COVID-19 crisis has negatively affected the hospitality and tourism industries in Kuwait by forcing Small-Medium Enterprises (SME) in Kuwait to curtail much of their businesses. On April 6, 2020, the Kuwaiti government extended curfew hours and imposed lockdown of certain areas (WorldAware, 2020). These new measures were a part of the government's effort to prevent the spread of COVID-19. But this also meant that public were banned from meeting in restaurants, cafes, and commercial centers. Intrinsically, this meant that outlets like coffee shops, restaurants, hotels and travel agencies had to close their doors until further notice. Together with earlier suspension of commercial flights to and from Kuwait, travel and tourism had already taken a plunge. Altogether, the preventive restrictions meant that inter-dependent businesses were collectively doomed

(WorldAware, 2020). Following from the extended curfew and lockdowns, SMEs started to feel the financial crunch caused directly by coronavirus disease. At least 45 % of Kuwaiti small business owners said they had suspended or shutdown their businesses while 26% were on the verge of collapse with revenues dropping more than 80 % (Bensirri Public Relations, 2020). Irrefutably, with the increase in the pandemic, many small businesses in Kuwait have become clueless about their future.

The problems faced by the SMEs is that COVID-19 has moved from a health crisis to an economic crisis. Business owners are fervently trying to survive both the crises almost certainly with lesser resources. Some sectors suffer more than others with accommodation, food service and travel being most hit (Skidmore, 2020). It is proposed that businesses undergo a four-phase process. First, businesses see a collapsing demand with a plunge in the cash received. Second, businesses see a dwindling of product and services necessary for business as the supply chains are increasing broken (for the same reasons). Third, remaining open under lockdown or partial lockdown situations posed new work conditions never experienced before. Face masks and social distancing although disruptive to human interaction have become essential. The lockdown also imposes intricate problems of workers travelling to and from work. Fourth, reduced workforce and movement control compelled small business owners to work with greatly reduce workforce (Skidmore, 2020; Besenyő, Kármán, 2020).

To put it in a statement, the plight of small business owners has not been heard from the victims themselves. The fragility of the SMEs is often assessed from business indices available from national statistics. Administration based on such statistics "failed to successfully choose, monitor, and keep track of how the young entrepreneurs managed their fledgling businesses" (Al Sharekh, 2018). Thus, it is essential to understand the voice of the business owners to better help them sustain or regain their businesses. The effect of COVID-19 needs to be comprehended from the literal voice of the small business owners themselves.

The aim of this study was to culminate in a credible comprehension and interpretation of the effect of COVID-19 on the collapse of Small-Medium Enterprises and failing employment.

1.1. Purpose of the Study
The purpose of this study was to explore the extent to which COVID-19 has affected SMEs namely, coffee shops, hotels, restaurants and travel agents. The study is scoped on the business individual, the collapsing business and anticipation of governmental assistance. The study examined the slew of factors hitting the business individual and how businesses managed to survive – literally from the disease and the grips of sustaining. It also explored the hopes and expectations of business to survive the pandemic with government initiatives.

1.2. Questions Guiding the Research
The study examined the perceptions of businesses affected by the COVID-19 pandemic. The phenomenological methodology allowed participants to express their own experiences and consequently the direction of the study. The participant expression was based on three guiding questions which provided the framework for this study:
1. How are individual business owners affected by the pandemic?
2. What are the main issues and their resolutions to bounce back by businesses?
3. What government assistance do business owners expect in bouncing of the pandemic?

2. Literature Review

COVID-19 also known as the Coronavirus is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This is a new strain of infection that appeared toward the end of 2019. The virus was first identified in Wuhan, China and reported to WHO on December 2019. The virus spread rapidly across the globe and WHO declared the virus a public health emergency on January 30, 2020. On March 11, 2020 the virus was named COVID-19. By then it had spread to over 118,000 cases in over 110 countries that the World Health Organization (WHO) declared a coronavirus pandemic outbreak. This viral respiratory disease caused symptom that occurred after 1-14 days following exposure of an average of 3-7 days (WorldAware, 2020). The symptoms include fever, fatigue, cough, difficult breathing, sometimes worsening to pneumonia and kidney failure - especially in those with underlying medical conditions. The Coronavirus caused the COVID-19 pandemic which is part of a worldwide phenomenon. As of June 25, there were 485,707 deaths and 9,566,268 confirmed cases of the disease (World Health Organization, 2020).

There is currently is no vaccine available for treating COVID-19. However, symptomatic treated is provided by early emergency medical support. The control of COVID-19 requires drastic action that arrest the disease from spreading. COVID-19 spreads readily through symptomatic people to others who are in close contact. The virus is transmitted through direct contact with respiratory droplets arising from coughing and sneezing of an infected person. Individuals can also be infected from and touching surfaces contaminated with the virus and then touching their face (e.g., eyes, nose, mouth). COVID-19 virus may survive on surfaces for several hours, but simple disinfectants can kill it (UNICEF, 2020).

Unfortunately, the drastic measures required to prevent the spread of COVID-19 requires several legislated actions that prohibit the normal functioning of society. These include wearing face masks, social distancing, stay home and the ultimate lockdown of all movement. Consequently, normal business activities cannot be conducted for fear of spreading the disease. Most business have had to close their shops or malls resulting in a multitude of unprecedented issues. Closing shop means losing business and therefore losing revenue. This triggers a domino effect of issues forefront of which is employment and the welfare of the employees.

The closure of businesses means that many businesses are unable to operate and are closed down. Following the institution of lockdowns in Kuwait in March 2020, 45% of business owners indicated they have suspended or shutdown their business. A Kuwait COVID-19 business impact survey reported that a further 26% were about to collapse due to a revenue drop of over 80% (Bensirri Public Relations, 2020).

Among the industries, the demand for hospitality including, restaurants, hotels and travel has been high. Indeed, the hotel-restaurant-tourism industry are interlocked. Restaurants that were based on direct customer presence on-location have been hard hit. Similarly, hotels and tourism have been severely hit due to the inter-relationship between the industries. Cancellation in restaurant catering and hotel stay are in tandem with cancellation of planned trips with none scheduled for the near future (Creamer, 2020).

Within the hospitality industry, businesses are highly dependent on supply chain networks. COVID-19 breaks these supply chains themselves by a contagion effect. As one business collapses, the supplier above and the consumer below are almost certainly disrupted into a sinking whirlpool (Baldwin & Mauro, 2020). These disruptions rapidly breakdown business resilience and culminate in mass layoffs, inability to sustain financial commitments, risk of bankruptcy, and the ultimate closure for many (Bartik, Bertrand, Cullen, Glaeser, Luca, & Stanton, 2020).

Globally, businesses experienced incredible levels of disruptions. Most businesses are searching for ways to survive the COVID-19 pandemic. This is particularly true for business owners of SMEs who are left with little choice. Such businesses are finding ways of identifying their position amidst their employees, their customers and the legislation. Business owners have to juggle survival in the short-term, as well as long-term, as workforces and communities try to function and perform, while struggling to cope with what is happening in their daily lives (Accenture, 2020).

Following such reports, the author embarked on a research to study what and how businesses perceived the pandemic as seen from their point of view with particular focus on the hospitality and tourism industries.

3. Methodology

3.1. Research Design

The purpose of this research was to foster an understanding of how a particular social group experienced the world. This was accomplished through an explanation by the researcher about an event within the specific social context (i.e. business owners affected by COVID-19 pandemic). This explanation is for others (readers) to visualize how an area of the social world functions with many individuals each with a subjective worldview. The objective then is to collate a collective view of the event. Thus, the process is one of decoding information in which meaning is derived from the specific social context (Newman, 2014).

In this study, the axiological stand is that the researcher's value affects the conduction or outcome of the research studied. Simultaneously, the subject's values also affect the conduction and outcome of the research. By way of epistemology, the researcher's presence affects the outcome of the research by interaction with the subject. Ontologically, true knowledge cannot be obtained by repeated investigations because they may not converge on the same outcome. Truth therefore, is a social construction of those in a particular society. In this case, the society that was affected by the COVID-19 pandemic. The best research paradigm is therefore an interpretivist with a phenomenological approach (Creswell, 2014). Hence the research methodology needs to be conducted by an inductive approach through unstructured interviews or observation. The outcome of the research can change in time and results are influenced by both researcher and subject who co-create the conduction and outcomes of the inquiry process. This approach is commonly used in the social sciences and regarded as an analytic adaptation that represents a faithful vocalization of the people who experienced the phenomenon (Fendt, Wilson, Jenkins, Dimmock, & Weeks, 2014). A similar study using phenomenology on the COVID-19 outbreak has been conducted on perceptions and psychosocial consideration of Spanish nursing students (Collado-Boira, Ruiz-Palomino, Salas-Media, Folch-Ayora, Muriach, & Baliño, 2020).

3.2. Sampling Plan

The sampling size for phenomenological studies is recommended to be 5 – 25 (Creswell, 2014). This indicative sample size is helpful to note that ultimately, the required number of participants depended on reaching saturation of the quotation-coding process and no new theme, category, or information emerged from further interviews (Bradley, Curry, & Devers, 2007). Participant selection was by purposeful sampling and snowballing which helped to identify a total of 25 participants.

Trustworthiness of the research was attained by individual participants willing to describe their experience of the phenomenon. The individual participants agreed that they voluntarily express their true feelings and describe any relevant physiological or psychological experiences that occurred with the feelings. In all cases, data was

collected through in-depth dialogue between the researcher and participant. In phenomenology, this is also the point when analysis began. During the interview, the researcher simultaneously assessed if further data collection was necessary (Smith, 2010).

3.3. Study Participants
The study participants comprised of 2 coffee shop owners, 6 hotel owners, 10 restaurants and 7 tourist operators. The participants were aged between 35 and 62 years. There were 19 males and 6 females. All 25 participants owned their businesses and were directly affected by COVID-19.

3.4. Trustworthiness
Credibility is the equivalent of internal validity in quantitative research and is related to the trustworthiness of the research findings. Credibility is an indication of how well the research findings represent the acceptability of information extracted from the participant and the correctness of the extraction as perceived by the participant (Korstjens & Moser, 2018). Another aspect of trustworthiness is reflexivity. Here, the researcher must be aware of self-biases in the process of collecting, analyzing and interpreting data, and pre-conceived assumptions that may be inadvertently brought into the research. Thus, a researcher must put aside the researchers own biases so that the true experiences of respondents are reflected in the analysis and reporting of research (Korstjens & Moser, 2018).

3.5. Data Collection
The participants are mainly from hospitality and tourism industry. These include Coffee Shops, Hotels, Restaurants, Travel and Tour Operators. Data collection was primarily through telephone interviews with participants (business owners) who were affected by COVID-19. Using only simple unassuming guiding questions participants were asked to express their views of the impact of the pandemic. The guiding questions were unstructured and the expected response was a narrative of the participant's reflection. As interviews were made through the telephone verbal responses were noted impromptu. These were then transcribed to convert the spoken word to the written word to facilitate analysis immediately after the interview (Sutton & Austin, 2015).
Once all the research interviews had been transcribed and checked, pertinent quotations were noted and coded. Field notes compiled during an interview were useful complementary source of information to facilitate this process as the gap in time between an interview, transcribing and coding can result in memory bias regarding nonverbal or environmental context issues that may affect interpretation of data.

3.6. Data Analysis
The participant transcripts were read and re-read to look for communal views among the participants. The researcher implemented a process of bracketing by an iterative reflexive consideration of the quotations. Although total bracketing is not achievable the researcher made conscious attempts to put aside personal assumptions so that the true experiences of participants were reflected in the analysis and reporting of the research. Using this method, a total of 385 Quotations were made from the data analysis. These quotations were assigned to 34 Codes created directly from recurring views of the participants. No Code was predetermined. Coding and data analysis were done using Atlas.ti (Atlas.ti, 2020). The conceptual framework of this research is shown in Fig.1.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
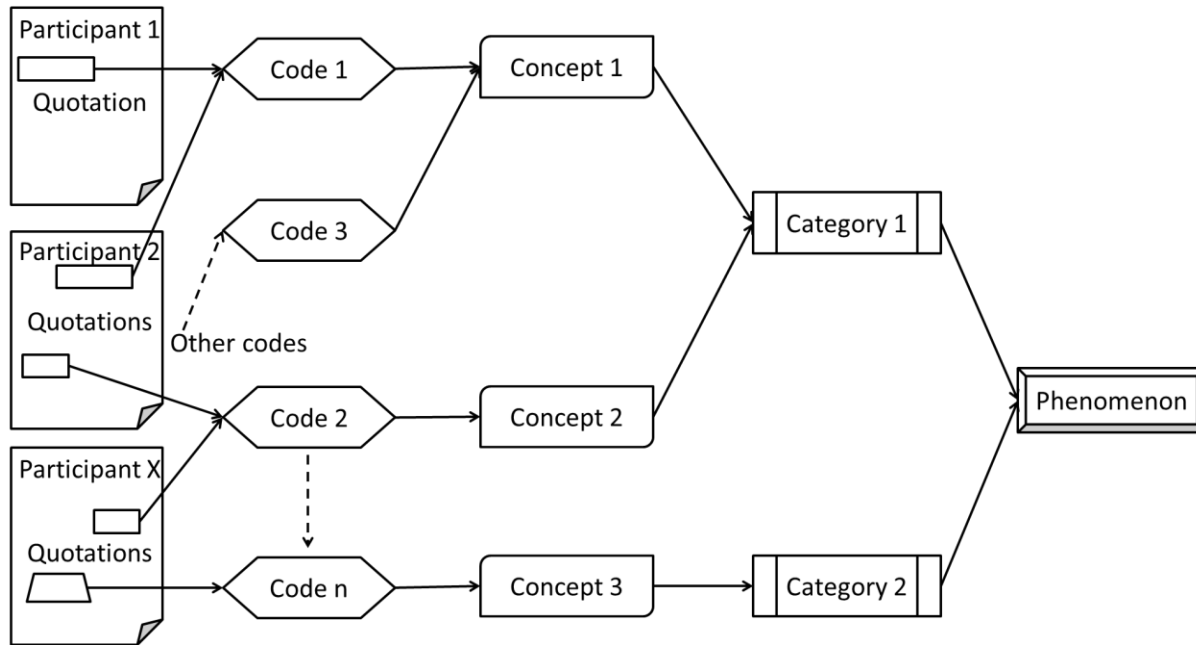
Fig. 1. Conceptual framework of phenomenology research in this study.
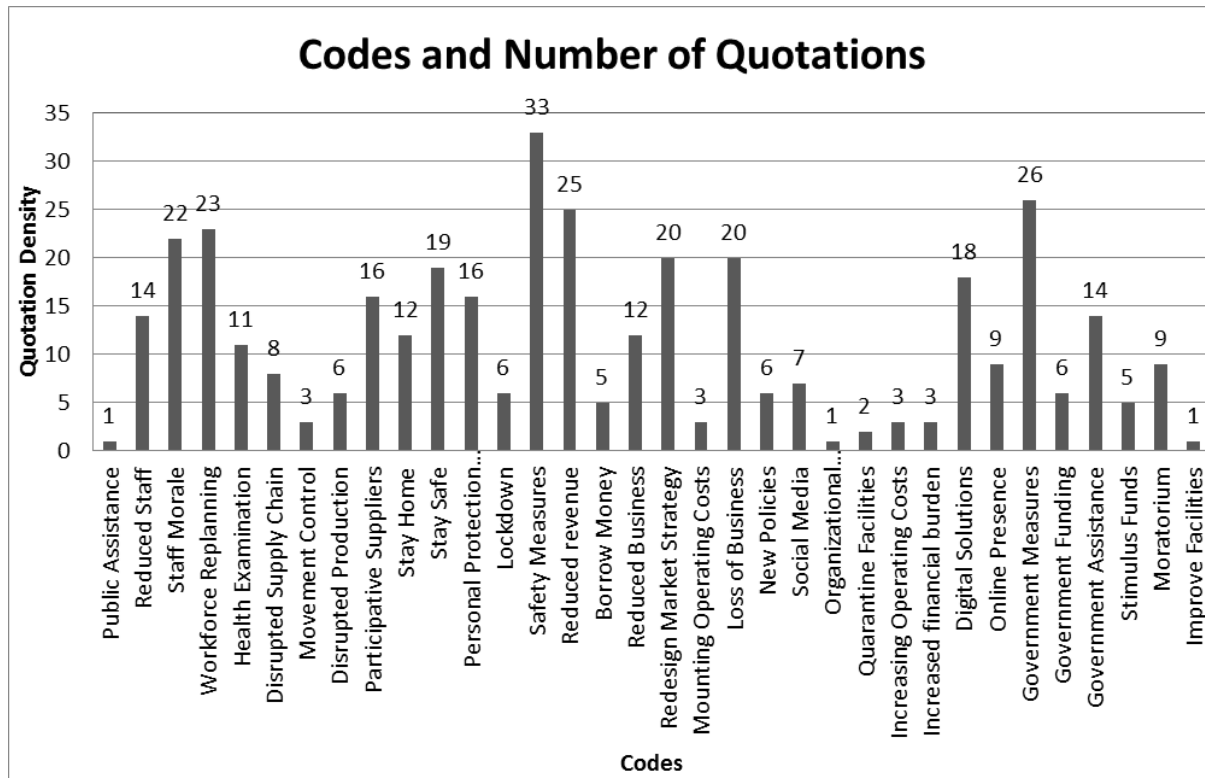
Fig. 2. Codes and quotations from participants.

From this data, the 34 codes (Fig.2) were assigned to meaningful concepts pertinent to the objectives of the research questions. A total of nine concepts were identified as shown in Fig.3. These were further grouped into three categories comprising Individual (staff and social distancing), Business (supply chain, business, resurging, cash flow and work remotely) and government (initiative and recovery plan).

Category	Cum. Code	Concept	Code	Code Density
Individuals	157	Staff	71	
		Social Distancing	86	
Business	167	Supply Chain	33	
		Business Relations	85	
		Resurging	16	
		Cash Flow	6	
		Work Remotely	27	
Government	61	Initative	46	
		Recovery Plan	15	

Fig. 3. Code density, concepts and categories.

Of course, there were many ways of synthesizing and presenting the data. However, any conclusions drawn by the researcher has to be supported by direct quotations from the participants. Thus, it will be clear to the reader that the themes that emerged in the study are solely from the participants information and not from the researcher (Creswell, 2014).

4. Thematic Analysis

From considerations in the last section, three themes that emerged purely from the quotations assigned to codes, codes assigned to concepts and concepts assigned to categories. Themes are generalized propositions emerging from a particular clade of categories, concepts, codes and quotations. Themes can also include the relationship of codes, which tag data that link concepts and categories to each other (Bradley, Curry, & Devers, 2007). In this study, three themes emerged as identified by Individual, Business and Government as shown in Fig.4. The thematic analysis is explained next. Note that the thematic concepts comprise of codes given as the heading for each paragraph.
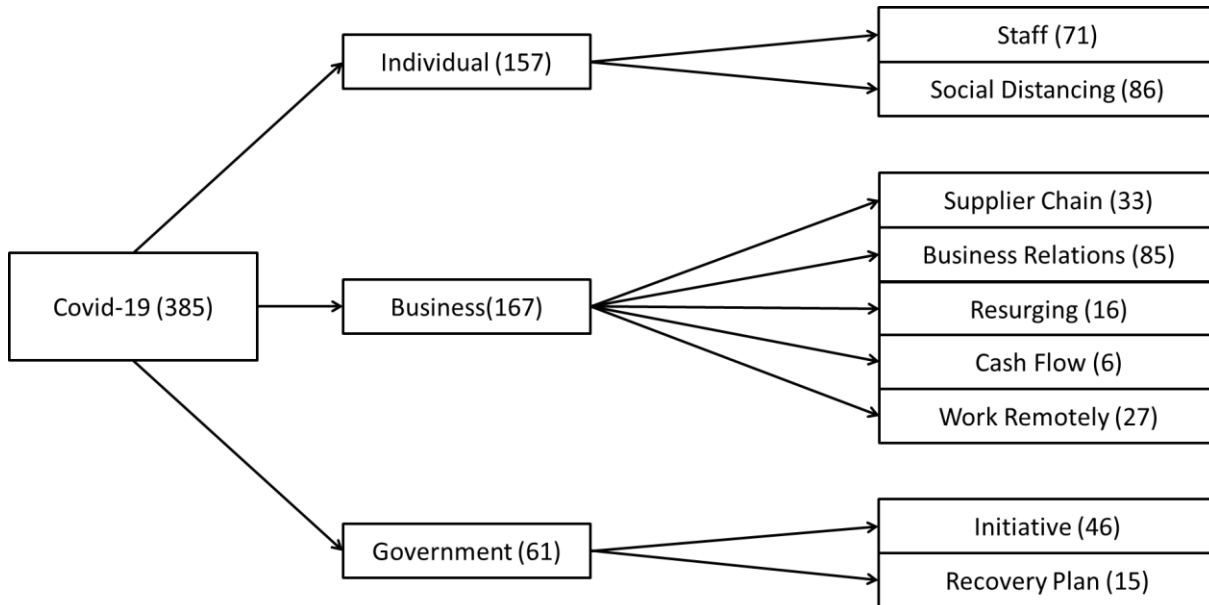
Fig. 4. Emergent themes for Kuwait hospitality and tourism industry.

4.1. Theme Individuals

The emergent theme of concepts and codes for Individual is shown in Fig. 5. A detailed explanation of each code follows.
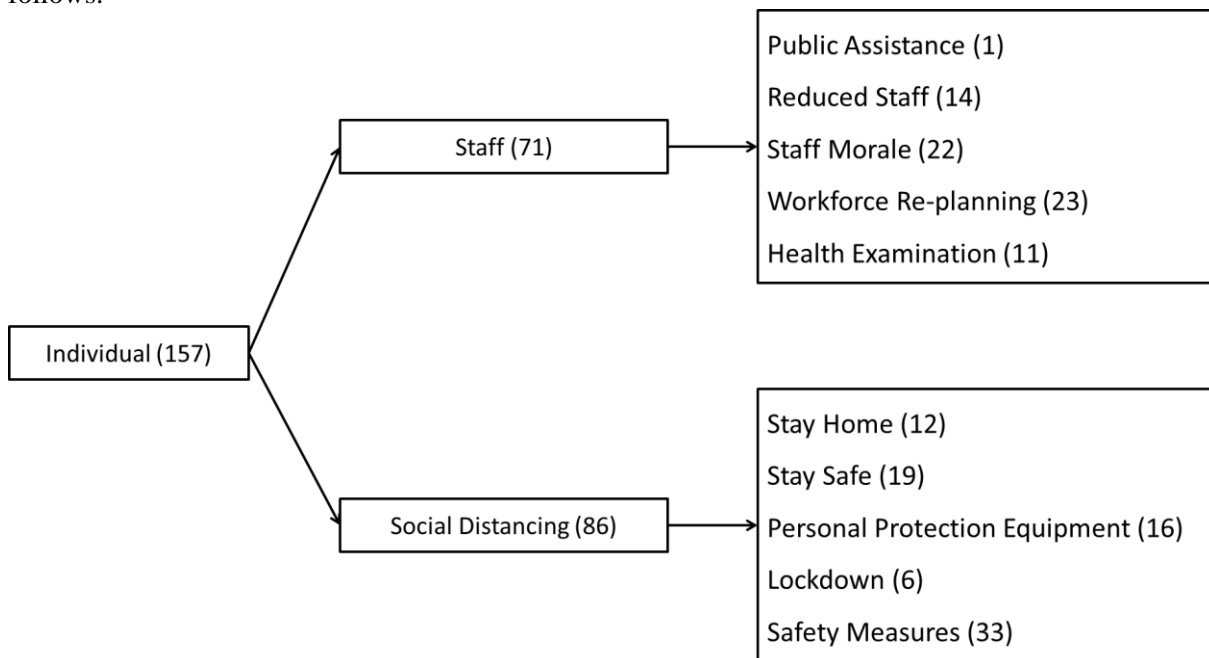
Fig. 5. Theme of concept and codes for individual.

4.1.1. Staff

Public Assistance: Managers expected public assistance from all stakeholders including customers, staff and the public.

Reduced Staff: Many businesses had to cut their staff by half. As branches were shut down the workforce had to be reduced between 20-50% with the business disruption. The staff reduction was necessary to overcome the situation. Only key staff were employed. This was also a huge challenge as some employees were already on vacation or planning to do so. The shortfall in cash revenue also meant the salaries had to be cut. Some employees planned to leave as there is no work and salary reduction was not viable. Availability of new staffs for business also met with challenges aggravated by the lockdown and curfew.

Staff Morale: Staff morale was greatly affected as staff experienced a high level of mental strain and frustrations as they faced this situation for the first time. Salary cuts to the skilled staff greatly affected their morale. Employees whose vacations were approved had to be cancelled resulting in lost confidence and poor mental attitude. Work hours were reduced so employees were not over-worked for the reduced salary. Training and counselling were conducted to boost the employee morale. Additionally, a savings fund was suggested for employee welfare.

Workforce Re-planning: Business managers were mainly concerned with the employment of workers as most had lost their employment with them. Hotels had to continue to support customers already with them. Only essential services like housekeeping could be provided as many employees were asked to go on leave. A core employee group was maintained to service elite customers. Three shifts were reduced to two. Reduced workforce meant that workload had to be distributed. In the travel industry, work was conducted within the curfew hours. Some staff were asked to work from home much like call centers.

Health Examination: Coffee shop managers ensured that health examinations were conducted by encouraging their staff and customers to make use of proper PPEs while entering their premises. Orders were mainly through phone and custom-made mobile app specially designed for this purpose. Hotels kept track of their staff who worked from home on a regular basis. Any employee tested positive was transferred to quarantine for medical treatment. Restaurants and travel industry planned installing thermal scanners on premises to fight the pandemic. Routine medical examination was conducted for staff. Businesses promoted a hygienic and sterile environment for employees and customers.

4.1.2. Social Distancing

Stay Home: Social distancing was very important. Coffee shops urged their staff to stay at home until the situation improved. Although most hotel staff stayed in the accommodation provided, they were told to stay at home. Since many of them stayed in lockdown areas this made their transportation difficult during the curfew times. In the travel industry, around 60-75% of the staff had to stay home. Among them 50% worked from home.

Stay Safe: Most coffee shop customers who had their morning coffee stopped coming in fear of the virus spread. So, coffee shop staff were directed to practise social distancing. Menu cards contained important contact numbers of health centres for contact during an emergency. Hotels directed their staff and customers to practice social distancing at all times. Transportation arrangement was available to help customers reach their destination between curfew times. More safety procedures were planned for implementation to ensure customers were safe and healthy. Restaurants staff always maintained social distancing. This constrained in employing few staff in the kitchen area with strict rules to practice social distancing. In the travel industry, organizations created an elite

group to monitor the safety measures used while transporting customers to the airport. Rules and principles were set for employees to follow in order to create a safe working environment.

Personal Protection Equipment: Coffee shops had to provide personal protective equipment (PPE) to staff. Customers were provided with essential services like food and PPE. The PPE increased the monthly expenses. Additionally, masks and a pair of gloves were provided to customers who ordered above a minimum amount. Hotels also followed safety precautions with the use of PPE like masks and gloves. Providing PPE to staff and customers increased expenses for the company. Restaurants also provided PPEs to staff and customers. Strict measures were taken to promote the use of personal protective equipment in the business premises. Essential services like food, water, gloves, sanitizers and other PPEs were made readily available. In the travel industry, PPE was made available to staff and they were encouraged to use it when they travelled or had contact with the customers as recommended by the health authorities. Customers were encouraged to use PPEs when they entered the premises.

Lockdown: All businesses were restricted to function during the lockdown. As the government shut down majority of the businesses, other related businesses had to shut down. Many branches closed due to the lockdown as part of government decisions. Many staff who could not travel to work worked from home.

Safety Measures: Safety measures seem to be the most concerning aspect. Staff were provided with gloves and masks to protect themselves. All measures were taken to ensure staff and customers were not infected. PPE was used without wastage. Suppliers who followed precautionary measures and safety policies were preferred. Staff were given specific directions on hygiene measures to follow as recommended by the government. As an organization, many have implemented the 5-meter apart policy even though this meant reducing the number of customers in the shop. In the coffee shops, tables were sanitized before and after customer usage. Hotels provided sanitizers in the hall way and in front of lifts for both staff and customer safety. Timely brochures containing latest safety rules published by the government were distributed among the staffs and resident customers to make them aware that all were together in the fight against the pandemic. This strategy helped the customers to identify the business as taking safety as the first priority. Hotels undertook to provide accurate information so clients were informed about the virus and steps taken to fight it. Rooms were disinfected before and after a client's stay. Sanitizers were installed in the premises. Social distancing was made mandatory. Safe travel and other precautionary measures helped the customer confidence. In the travel industry, premises and branches outlets were sanitized every alternate day to ensure safety. Safety policies were implemented for the safety of the employees and the customers who entered the premises for their travelling needs. Only safe travelling destinations were included in the packages so that customers travelled without fear of the virus.

4.2. Theme Business
The emergent theme of concepts and codes for Business is shown in Fig. 6. A detailed explanation of each code follows.
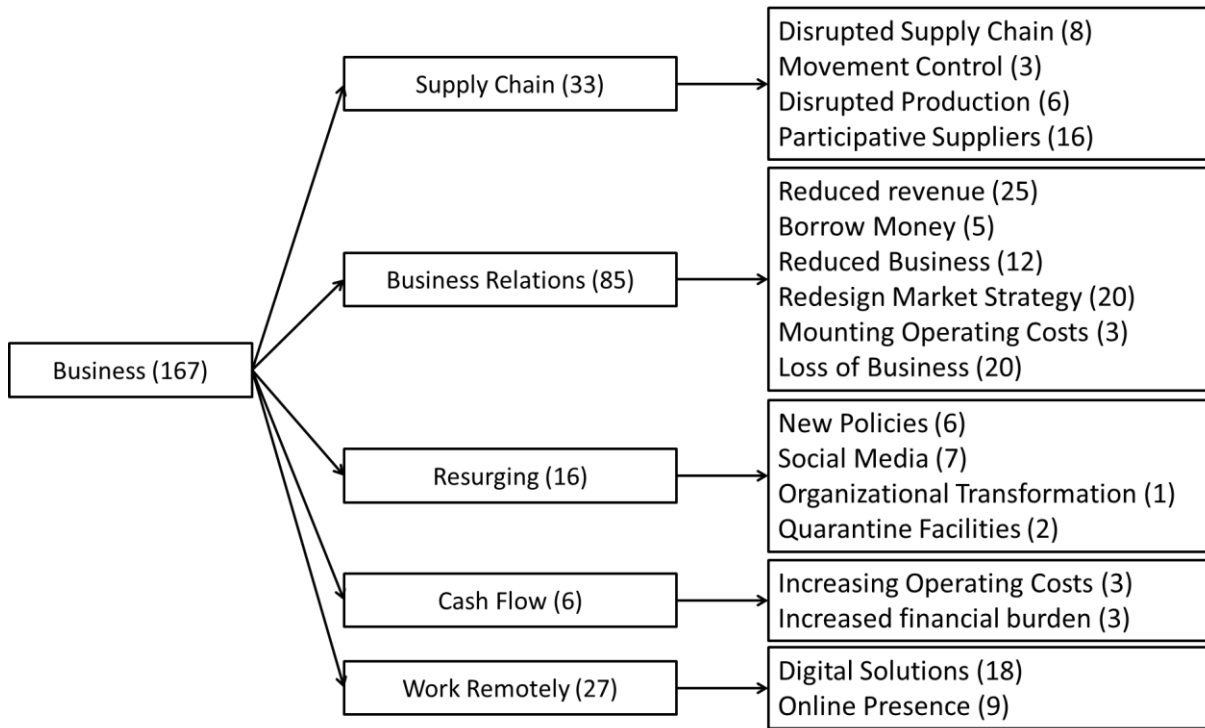
Fig. 6. Theme of concept and codes for business

4.2.1. Supplier Chain

Disrupted Supply Chain: Businesses stopped and the supply chain was difficult to maintain. Suppliers were also in the same situation unable to provide their services. Hotels faced severe challenges of supply chain management since food suppliers and restaurant caterers had stopped working during the lockdown and curfew times. Restaurants faced similar problems since it was difficult to maintain relationship with vendors and suppliers who reduce their services to a minimal level.

Movement Control: The movement control greatly reduced customers visiting coffee shops and the sales went down. As public gathering stopped, only door delivery was provided. This meant acquiring passes for transporting employees to work during curfew conditions.

Disrupted Production: Suppliers had passes which made the availability of essential supplies. The orders for food supplies were reduced as there were few customers. Hotels and restaurants reduced the food items to sustain business. In the travel industry, transport providers, accommodation providers and tour operating service providers were shut down as it was difficult to coordinate tour packages and arranging accommodation for tourist customers.

Participative Suppliers: Some more participative suppliers generated plans and ways of continuing working relations. Manufacturers and food suppliers were contacted directly particularly those who could arrange to transport the supplies. Transportation cost was borne by the business so as to maintain a good relationship with the suppliers. Travel passes were also arranged by the business with cooperative suppliers. Restaurants made

agreements with leading pharmacies and other outlets to provide personal protective equipment like gloves and masks. In the travel industry, customer relations were maintained through emails and other social media.

4.2.2. Business Relations

Reduced Revenue: Reduced revenue was seen across all businesses. Coffee shop revenue was affected through direct sales. People refrained from door deliveries particularly during total lockdown. For hotels, many bookings were cancelled and the money refunded to customers. The government also required that hotels were shut down resulting in huge losses. Revenues dropped to 30-50% during the lockdown. Restaurants were affected by loss of takeout and delivery which had stopped. Customers driving in for food and home deliveries had stopped. The cash flow had come to a standstill. Phone orders which generated 40% of the revenue stopped. Private catering and bulk private orders stopped. In the travel industry, around 60% of customers were refunded fully as they had booked before the shutdown. Another 40% had to be provide partial refund as they booked tickets more than 4 months before the shutdown. Travel packages also decreased as customers who booked them backed off. The reduced work hours further affected productivity.

Borrow Money: Hotels could not borrow money from the banks as the banks were shut down and loans were not readily available. Travel agents also faced similar problems as they could not opt for loans to hold back losses as the banks shut down their activities.

Reduced Business: Coffee shops were partially open during non-curfew periods. Nevertheless, business was affected from the beginning of the virus outbreak. For hotels, customers who intended to stay cancelled their reservations. The occupancy rate declined considerably. The cash flow was affected as the credit booking system stopped. Food prices were reduced in the restaurants. All these seriously affected the hotel business. Restaurants had to operate in a regulated timeframe especially the non-curfew hours, but adhering to the restricted time periods was very difficult. In the travel industry, accommodation providers for tourists were all shut down. As the government introduced further restrictions, travel agents had to follow the shut down operations completely. The closure of the airport posed a serious blow which further affected the business.

Redesign Market Strategy: Coffee shops introduced more discounts and complements for their customers. Participative suppliers would be considered first after the lockdown. Brochures with safety measures for the pandemic would be designed and printed for customers. Hotels were keen to adopt cloud-based Property Management Technologies which enable activities of the hotel from a remote distance. At the same time, customers would be encouraged to use custom-made mobile application that served the customers without being present at the hotel. Hotels also devised plans to include more discounted rates for routine customers. This provided personalized offers to customers to fulfill the needs of customers. This new policy would promote an emotional connection between the hotel and the customers. Restaurants aimed to provide good nutritious food to their customers by implementing new recipes in their menu. Food will be cooked on order and supplied fresh. Restaurants chose the internet as their business platform. In the travel industry, new strategies would be created to attract customers and stakeholders. Customer care cells were planned to cater customer queries.

Mounting Operating Costs: Businesses had to pay salaries to employees and take care of their safety resulting in increased financial expenses. For restaurants, it was a difficult task to pay staff during the lockdown and curfew. The unavailability of funds led to inability to pay staff salary timely. For travel agents, refunding money demanded by customers incurred severe operating losses.

Loss of Business: Coffee shops were disrupted of daily routines. Loss of business was very high during lockdown. With the ban of public gathering customers stopped regular order of coffee. Most of the revenue generating branches affected by the lockdown closed business within the first two weeks of the pandemic. Closing down the coffee shop resulted in huge losses. For hotels, the pandemic plunged the industry tied to most other businesses locally and globally. The high level of cancellations and postponements in bookings caused severe loss of business. The hotel business had been affected drastically. For restaurants, the government closed all food outlets during the total lockdown resulting in total loss of business. Many branches in the lockdown areas were also shut down completely. The closure of local markets resulted in loss of business. With the lockdown, the travel industry came to a standstill. Many pre-booked travels were cancelled. People postponed their travel dates. Vacation packages were lost. The airport was shut down. And, much money had to be refunded resulting in tremendous loss of business.

4.2.3. Resurging

New Policies: The hotels conducted research as how to manage the hotel without direct contact with customers. They worked on their management policies regarding room service, advertising and introduced a proper check-in and check-out process. One of the main policies was to generate feasible rates and discounts to customers. Another was to attract millennial travellers. The new policies and strategies would be implemented in their business. Restaurants generated new policies and regulations for employees to follow. The travel industry had introduced a new policy of including in their brochures and pamphlets, information about the virus and also locations of health centres to contact.

Social Media: Hotels were keen to conduct sales, advertising and business development activities remotely. A hotel app would be used to entertain their guests without actually being present there. Hotels also devised plans to retain existing regular customers by giving them latest updates of the situations through a portal. Restaurants would use social platforms to provide the latest updates on the policies of the government to their employees. In particular, employees would be informed of new developments regarding rules and regulations by the government through WhatsApp Group Messages. The system will also be used to take orders through WhatsApp numbers. A WhatsApp Group was created for employees at all branches. The employees were encouraged to communicate through the Group for any concerns. The daily menu was also be available through WhatsApp.

Organizational Transformation: Hotels ensured that different departments functioned together with management to produce a safe working environment to customers.

Quarantine Facility: Hotels were forced to provide premises for quarantine purposes. Thus, the flow of customers was stopped. Another hotel, had given its premises and transport facilities to transport nationals brought back from other countries to the quarantine areas.

4.2.4. Cash Flow

Increasing Operating Costs: The travel industry incurred high expenses to provide for staff welfare. Premises had to be frequently sanitized to enable a safe environment even though this was costly. Having to refund money completely for many travel bookings affected profits and commissions were lost from business partners abroad for arranging stays for customers.

Increased Financial Burden: Restaurants could not have private borrowings as the banks and other financial institutions were closed. Refunds had to be given to the customers who cancelled their bookings. Inevitable, employees had to bear salary cuts.

4.2.5. Work Remotely

Digital Solutions: Working from home is not an option for coffee shops. However, customers could order food and drinks through a mobile app rather than over the counter. This enabled customers to pre-order and pay through the app. The customers benefitted by pre-ordering, table booking, and paying for beverages beforehand. This made their coffee available once they arrived. Of course, different options like selection of number people, different flavours of coffee and preferred table was available in the App. In the hotel industry, digital solutions would enable remote business control. During the lockdown, most managers and supervisors worked from home. This is the future trend to implement measures to track activities remotely. It is likely that future business will be mainly based on technologies. As most of the businesses around the world are switching to embrace technology in their business, it is high time that hotels implemented the same. Introduction of Property Management Technologies was the future strategy to sustain. Contactless method of engaging guests would be a new strategy introduced in the hotel business. Therefore, it was appropriate to embrace technology in business. Many explored how to implement this as restaurants turned to technology. Some introduced a Facebook page to provide customers with new updates and nutritious recipes. Hotels planned to develop software through which customers could order directly. Customer requests would be forwarded to computerised system. The travel industry devised plans to give discounted rates and safe travels to the customers who booked through technology apps.

Online Presence: Many hotel supervisors and managers had been working from home. A majority of team leaders were asked to work from home to understand customer queries. An online presence would implement technologies to serve customers without coming into contact with them. Staff could work from home to act as a customer care cells that answered customer queries. Online campaigns were promoted to protect staff and customers.

4.3. Theme Government

The emergent theme of concepts and codes for Government is shown in Fig. 7. A detailed explanation of each code follows.
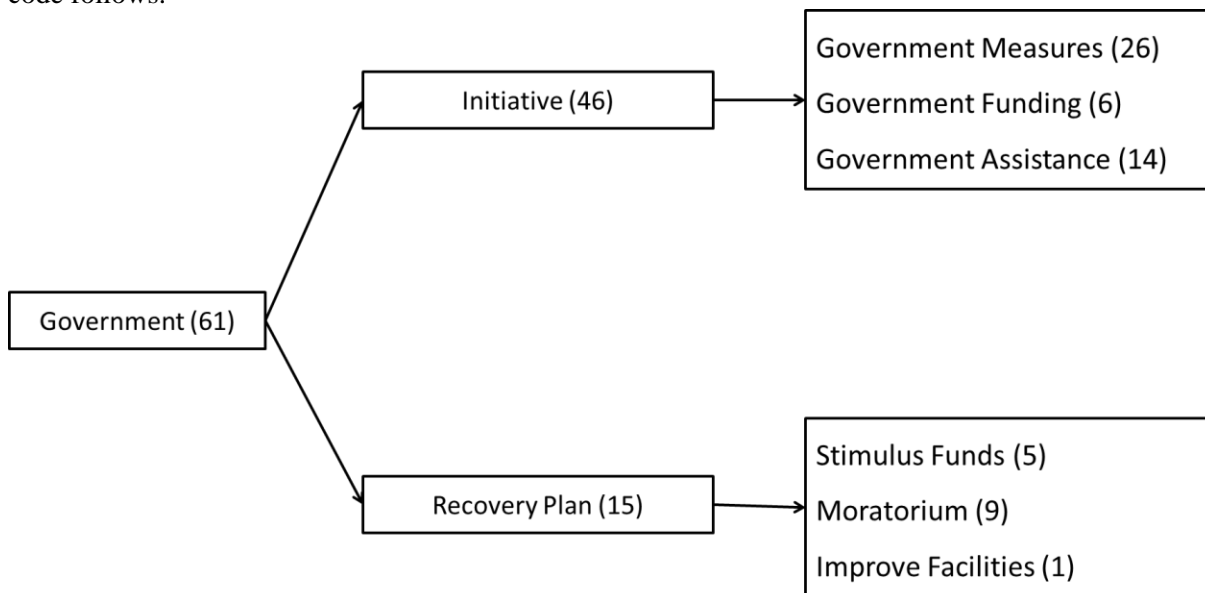
Fig. 7. Theme of concept and codes for government.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

4.3.1. Initiative

Government Measures: In order to recover from the pandemic, a limited and steady operation would be most suitable with the government health authorities' approval. Coffee shops anticipate that there will be more supportive measures from the government and banks. While vaccines and medicines are developed businesses will adopt to live with the virus. Safety measures need to be improved in in admitting people to coffee shops. Sanitizers will be installed at occupied tables to enable customers to use then when needed. Banks are expected to extend their loan waivers so that money was available for re-investing in the business. As the government introduced 5 phases of reopening, hopes are that coffee shop business will function normally in the future. Hotels have followed the government's instructions step-by-step. As the government is considerate in supporting the hotel and hospitality industry, it is hoped that the government will continue to support the hotel industry. If the government advocates living with the pandemic, hotels would strictly follow the relief methods by the government. It is also expected that the public will support by complying with safety precautions as explained by the government. Hotels intend to work side by side with the government's efforts to fight the pandemic along with other NGOs. Restaurants plan to recover from the pandemic by practice business according to the government guidelines. In case the government advocates living with the pandemic, restaurants will follow the government guidelines and be socially responsible. Hotels will need to adapt to the new situations; with the government support of granting permission to the restaurants to function. In the travel industry, if the government advocated living with the pandemic, the industry will operate along with the government's guidelines in the best interest of the businesses. Moreover, the banks announced waiver of interests and loans helped businesses to save money for other expenses. Following government instructions would be the best way to mitigate the pandemic by taking measures and steps to control the spread of the virus.

Government Funding: Coffee shops expect the government to introduce more measures to help the business. For hotels, the various subsidies and moratorium announced by the banks and government helped to ease the financial burden to a large extend. For restaurants, the availability of government fund would be utilized for generating an employee welfare fund through emergency assistance. The government sectors are expected to set aside further funds for sustaining the restaurant business sector. The travel industry also expects the government and the banking institutions to introduce more grants and funds to help business growth.

Government Assistance: Coffee shops anticipate government support by providing operation facilities after businesses reopen after the lockdown. Hotels anticipate the public and the government will assist the implementation of new technologies in their venture. Furthermore, an increase in the lending period will also help in loan repayment. This assistance could also be expected as a cooperation not only from government but also private, public and semi-government sectors. This will help hotels stay up-to-date with the latest government policies introduced and relief measures introduced for recovering from the pandemic. However, it is expected that the government continue to introduce new plans and policies to help the restaurant businesses. Since, the restaurant business is a booming business, special policies should be generated by the government to support growth. The travel industry also expects further relief from the waiver of loans and interests by the banking institutions. This would help recover the loss incurred due to refunds and cancellations. The industry believes that the government will announce more incentives to the travel industry. The government of Kuwait is considerate in their efforts to bring the economy back to normal.

4.3.2. Recovery Plan

Stimulus Funds: Hotels suggest stimulus funds offered by Kuwait Banking Association and Central Bank of Kuwait will help to ease the loss incurred during the pandemic. Loan waivers by the financial institutions will also help them to pool the money for further developmental programs after the pandemic. Thus, it is expected that the

government will support by introducing more stimulus funds to support SMEs like the hotels. Restaurants suggested that stimulus funds like reduction in the discount rates and increase of limit of finance to a 100% had proven to accumulate the money for necessary changes. The stimulus package announced by various banks had also benefited them.

Moratorium: The government's 6-month moratorium helped coffee shops to sustain during the lockdown. Even though, they were functioning between the curfew periods and there was enough revenue generated, the moratorium helped greatly. For hotels, the 6-month moratorium helped to pay important necessities like providing salaries and buying PPEs for employees and resident customers. The 6-month moratorium by the government helped the hotels to recoup the losses and invest the money back into business. For restaurants, the tax reliefs and 6-month moratorium helped them to utilize the money to pay staffs. It lowered the risk of SMEs by about 25-75%, thus helping businesses to sustain. The moratorium also helped them to sustain through pandemic. It also helped them to provide PPEs to employees. Restaurant admitted that loan waivers and moratorium introduced by the government had greatly helped them sustain during the difficult situation. The 6-month waiver of loan repayments proved to be helpful. In the travel industry, the moratorium announced by the government helped to survive the losses incurred due to the virus. The moratorium helped to ease the loss suffered during this period particularly in employee retention as they were paid salaries and bonuses for Ramadan.

Improve Facilities: The hotel took the pandemic period in a positive way by using the period for renovation and maintenance.

5. Discussion

Based on the findings described in Section 4, the following questions are answered.
1. How are individual business owners affected by the pandemic?
2. What are the main issues and their resolutions to bounce back by companies?
3. What government assistance do business owners expect in bouncing of the pandemic?
4.

5.1. How are individual business owners affected by the pandemic?
There are two ways in which business owners are affected.
First, business owners are severely affected by staff issues. Many SMEs had reduced their staff to between 20-50% with disrupted business. This reduction in staff manning the business was due to the inability of the SME to continue to hire the employees. Only key staff were employed due to shortfall in cash revenue. Staff morale was highly affected due to the loss of confidence associated with facing the problem first time together with the salary cuts. Business managers were mainly concerned with the employment of workers as most had lost their employment with them. Reduced workforce also meant that workload had to be distributed among remaining staff. Health examinations, thermal scanners and the usage of PPEs was necessary to promote a hygienic and sterile environment for employees and customers.

Second, many of the staff were asked to stay home for safety reasons. To ensure customer safety, staff were directed to practice social distancing. This was very constraining in businesses like coffee shops, and restaurants. Not only businesses had to provide essential services to their customers, they also had to provide Personal Protection Equipment including masks, gloves and sanitizers to customers entering the business premise. The effect of the lockdown was that, as more businesses shut down, many other inter-dependent businesses had to follow. Safety measures seem to be the most concerning aspect. Staff were given specific directions on hygiene

measures to follow as recommended by the government. Many had implemented the 5-meter apart policy even though this meant reducing the number of customers in the premises.

5.2. What are the main issues and their resolutions to bounce back by businesses?

The main issues faced by businesses was business relations and supply chain disruption. Business relations was the predominant factor. Many businesses were affected by reduced revenue. Revenues dropped to 30-50% during the lockdown. The cash flow had come to a halt. Phone orders which often generated 40% of the revenue also stopped. Around 60% of customer orders had to be refunded full payments as their services could not be fulfilled. The reduced work hours further affected productivity. Loss of business also accompanied the ban of public gathering customers. The closure of local markets also resulted in loss of business.

The supply chain was the next most important factor. As businesses closed, the supply chain was difficult to maintain. Other suppliers were similarly affected and unable to provide their services. Coordination between suppliers was difficult. Nevertheless, some suppliers were more participative by generating plans and ways of continuing working relations. For those who could arrange to transport the supplies, the transportation cost was borne by the buyer business so as to maintain good relationship with the suppliers. This would help broken supply chain links to be reconnected and enable service flow. Suppliers reconnected after the pandemic are likely to have a mutual business-survivor bonding that will quickly thrust business recovery.

The resolutions to rebound the business was clearly in place. One way to bounce back diminishing business was to redesign market strategy. Businesses introduced more discounts and complements for their customers. New strategies to include brochures with safety measures to follow during the pandemic was designed and printed in customer brochures.

A second way to rebound the business was to use social media platforms and portals to provide the latest updates on government policies along with business applications. In particular, employees would be informed of new developments through WhatsApp Group Messages. The system would also be used to conduct business through WhatsApp groups created for employees.

A third way to rebound the business was to develop new market strategies to work remotely with online presence and digital solutions. Customers were encouraged to use custom-made mobile application that helped to serve customers. Some business used cloud-based technologies to enable remote service activities. The method also provided personalized offers to customers and helped to fulfill the customer needs as much as possible. The new market strategies promoted an emotional connection between the business and the customers.

5.3. What government assistance do business owners expect in bouncing of the pandemic?

There are two facets to what government assistance are expected by businesses. These are government initiatives and government recovery plans.

The government initiatives expected are clearly on government measures to enable a steady operation with the approval of government health authorities. Businesses anticipate more supportive measures from the government and banks.

Many businesses also expect more government funding through grants and subsidies to be announced by the government to ease the financial burden to a large extend. The availability of government funding would be

utilized for employee welfare through emergency assistance. Moreover, the banks through the government are expected to announce waivers of interests and loans to further helped businesses to cover expenses.

Businesses anticipate the government assistance through incentives to implement new technologies ventures. This could be done by an increase in the lending period to help businesses to relax loan repayment. This assistance could be expected as a cooperation not only from government, but also semi-government, private and public sectors.

As for recovery plans, businesses expect the government to introduce stimulus funds. Stimulus funds would be used to ease the loss incurred during the pandemic. Loan waivers by the financial institutions will help businesses pool money for post-pandemic development programs. Business suggested that stimulus funds could be based on an increase of finance limit to 100% of value to accumulate money for necessary changes.

All businesses agreed that government recovery plans such as the 6-month moratorium helped them to sustain during the lockdown. The moratorium helped to pay necessities like providing salaries and buying PPEs for employees and customers. The moratorium also helped to recoup losses and invest the money back in to business.

5.4. Implications of the Findings for Practice
The research showed three themes identified in the research. Firstly, a fairly extensive outline of the effect of COVID-19 on SMEs has been elucidated. Secondly, the extent of problems faced by SMEs has been visualized from the view point of the business owners. Thirdly, and most importantly, the research has exposed in-depth expectations of SMEs as to how governments need to provide various initiatives and recovery plans to bring back business to pre-COVID-19 levels. Specific initiatives include government measures to revive hospitality and tourism industries with government funding and stimulus funds.

5.5. Recommendations for Further Research
Recommendations for further research are:
1. Conduct similar research on specifically how existing businesses struggling to sustain themselves could be assisted to regain their pre-COVID-19 levels of business. This could in fact be conducted at a national level. Although government bodies may have their perceptions of what needs to be done, the real needs of the business are best elucidated by a suitable phenomenological study. Such a method would have a better chance of identify true business needs.
2. Another study could be done on business owners who have lost their business. Bearing in mind such failed businesses failed for reasons beyond their control, it would be prudent to identify more accurately, how the failure occurred and what actions can be taken to revive these businesses. This would be best done by government bodies that administer to the local SME businesses.
3. Research of SME financial predicaments by banks and financial institutions is another important aspect. Banks and financial institutions stand to gain most by understanding the plight of failing and failed businesses and, creating a variety of business products (i.e. waivers, reduced interest rates, loans, funds and incentives) to support failing businesses and revive failed businesses.

5.6. Limitations

The limitations of the study are bound to the qualitative nature of the study although much effort had been included to reduce the subjectivity of the data. Researcher bias though reduced by bracketing cannot be completely avoided since some bias is not intrinsically knowable to the researcher.

Although the sample size was fairly large, and the interviews were conducted to saturation of quotations and codes, it would be difficult to assume that the selected participants were representative of the larger population.

6. Conclusion

This research has espoused phenomenology as a remarkable way of understanding social perception of a society from their own point of view. This phenomenological study exposed three themes of the COVID-19 pandemic on the collapse of SMEs and failing employment. The first theme revealed the plight of SME business owners and the hardships faced due to the pandemic. The second theme uncovered extensive experiential predicaments of the businesses. The third and most important theme revealed quite clearly, what SME business owners expect of government and financial bodies to support surviving businesses and revive failed businesses.

References

Accenture. (2020). *Connecting with changing customer habits*. Retrieved June 24, 2020, from Impact on Customers: https://www.accenture.com/mu-en/about/company/coronavirus-business-economic-impact

Al Sharekh, A. (2018). SME Funds as Vehicles of Economic Reform in Kuwait and the GCC. *Carnegie Corporation of New York*, 1-14.
Atlas.ti. (2020). Atlas.ti (8.4.24) for Windows, Scientific Software Development. GMBH, Berlin, Germany.

Baldwin, R., & Mauro, B. W. (2020). *Economics in the Time of COVID-19*. London: Centre for Economic Policy Research Press.

Bartik, A. W., Bertrand, M., Cullen, Z., Glaeser, E. L., Luca, M., & Stanton, C. (2020). The impact of COVID-19 on small business outcomes and expectations. *Proceedings of the National Academy of Sciences*, 117(30), 17656–17666.

Bensirri Public Relations. (2020, May 17). *Kuwait COVID-19 Business Impact Survey Finds 45% of Businesses have Shut Down Since February*. Retrieved June 23, 2020, from Bensirri Public Relations: https://www.prnewswire.com/news-releases/kuwait-covid-19-business-impact-survey-finds-45-of-businesses-have-shut-down-since-february-301060491.html

Besenyő, J., Kármán, M. (2020). Effects of COVID-19 pandemy on African health, poltical and economic strategy. *Insights into Regional Development*, 2(3), 630-644. https://doi.org/10.9770/IRD.2020.2.3(2)

Bradley, E. H., Curry, L. A., & Devers, K. J. (2007). Qualitative Data Analysis for Health Services Research: Developing Taxonomy, Themes, and Theory. *Health Services Research*, 42(4), 1758–1772. https://doi.org/0.1111/j.1475-6773.2006.00684.x

Collado-Boira, E. J., Ruiz-Palomino, E., Salas-Media, P., Folch-Ayora, A., Muriach, M., & Baliño, P. (2020). The COVID-19 outbreak: An empirical phenomenological study on perceptions and psychosocial considerations surrounding the immediate incorporation of final-year Spanish nursing and medical students into the health system. *Nurse Education Today*, 1-10.

Creamer, D. (2020). *COVID-19 Hospitality Industry Impact*. Retrieved June 23, 2020, from IDC Corporate USA: https://www.idc.com/getdoc.jsp?containerId=US46187920

Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches, 4th Ed.* Thousand Oaks: Sage Publications.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Fendt, L. S., Wilson, E., Jenkins, J., Dimmock, K., & Weeks, P. (2014). Presenting phenomenology: faithfully recreating the lived experiences of Surfer Girls. *Annals of Leisure Research,* 17(4) https://doi.org/10.1080/11745398.2014.938668

Korstjens, I., & Moser, A. (2018). Practical guidance to qualitative research. *European Journal of General Practice*, 24(1), 120-124.

Newman, L. (2014). *Social Research Methods: Qualitative and Quantitative Approaches.* Harlow: Pearson Education Limited.

Skidmore, R. (2020, April 7). *How can we help small business affected by the COVID-19 crisis?* Retrieved June 24, 2020, from International Trade Centre: http://www.intracen.org/covid19/Blogs/How-can-we-help-small-business-affected-by-the-COVID-19-crisis/

Smith, J. A. (2010). Evaluating the contribution of interpretative phenomenological analysis. *Health Psychology Review*, 5(1), 9-27. https://doi.org/10.1080/17437199.2010.510659

Sutton, J., & Austin, Z. (2015). *Qualitative Research: Data Collection, Analysis, and Management.* Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4485510/

UNICEF. (2020, March). *Key Messages.* Retrieved June 23, 2020, from UNICEF: https://www.who.int/docs/default-source/coronaviruse/key-messages-and-actions-for-covid-19-prevention-and-control-in-schools-march-2020.pdf?sfvrsn=baf81d52_4

World Health Organization. (2020, June 23). *WHO Coronavirus Disease (COVID-19) Dashboard.* Retrieved June 23, 2020, from World Health Organization: https://covid19.who.int/info

WorldAware. (2020, April 6). *COVID-19 Alert: Kuwait Extends Curfew Hours as of April 6; Imposes Lockdown of Certain Areas.* Retrieved June 24, 2020, from WorldAware: https://www.worldaware.com/covid-19-alert-kuwait-extends-curfew-hours-april-6-imposes-lockdown-certain-areas

Dr. Ahmad A-Fadly

ORCID ID: 0000000162051741

GREEN ECONOMY IN RUSSIA: THE INVESTMENTS' REVIEW, INDICATORS OF GROWTH AND DEVELOPMENT PROSPECTS

Elena A. Tarkhanova [1], Elena L. Chizhevskaya [2], Anhelica V. Fricler [3], Natalia A. Baburina [4], Svetlana V. Firtseva [5]

[1,3] Interregional public organization League of Higher School Teachers, 14/2/1 Pokrovka Str., Moscow 101000, Russian Federation
[2] Department of Transportation of Hydrocarbon Resources, Institute of Transport, Industrial University of Tyumen, 38 Volodarskogo Str., Tyumen 625000, Russian Federation
[4] Independent author, 12 Fedorova Str., Tyumen 625000, Russian Federation
[5] Department of Economy in the Construction, Institute of Service and Industry Management, Industrial University of Tyumen, 38 Volodarskogo Str., Tyumen 625000, Russian Federation

E-mails: [1]tarhanova333@mail.ru; [2]chizel76@yandex.ru; [3]abyscheva@mail.ru; [4]natalbaburina@mail.ru; [5]sfirceva@yandex.ru

Abstract. Currently the "green" economy is an important part of positioning in the international arena as an environmental component of sustainable development. Russia, as an active party in the international arena, supports resolutions on the "green" economy development and "green" financing tools for resolving issues of climate-resistant economic growth. Factors and trends in the Russian "green" economy development are radically different from most developed countries. At the same time, Russia has undeniable advantages in terms of preserving natural landscapes and the ecosystem services' potential. Russia also has huge and almost unused opportunities for "green" growth. Our article is devoted to these problematic economic issues related to the "green" investment development. It is a basis for environmentally sustainable evolution. We discuss the latest trends and facts in the the"green" economy development of Russia. In addition, we describe possible promising directions for its growth in the future. Our results can be interesting and useful for researchers and experts working in the field of strategic management, spatial development and innovation economics. It is attractive for stakeholders and politicians involved in the economics and environment issues.

Keywords: "green" economy; "green" investment; "green" growth; sustainable development; social responsibility; low-carbon development

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

1. Introduction

According to the Resolution adopted in 2012 by the UNO General Assembly, economic development leads to rapid accumulation of physical and human capital today. It is carried out at the expense into excessive depletion, degradation of natural capital and increasing inequality between people (The future we want, UN, 2012). Most of the world's countries agree with this aspect at the global level. Particularly in 2016-2017, 132 countries proposed a number of initiatives at the state level in the " green " economy developing area. These countries account 82% of all harmful emissions. As a result, the states that did not participate in the development of rules and standards in the "green" financing area need to accept the conditions and rules for the "green" economic model's development functioning today. These conditions and rules were developed by more active countries (Ministry of Finance of the Russian Federation 2017). As a result of the Paris agreement on climate change, all countries, including Russia, are required to have long-term low-carbon development strategies and plans for climate change adaptation and to implement appropriate measures. At the same time, the Paris agreement assumes the voluntary contribution principle for each country to the solution of the global problem into climate change (Principles of sustainable development, VEB RF 2016).

Taking into account Russia's membership in the UNO, it should be noted that the country's movement towards sustainable development requires a close study of foreign practice in forming a "green" economy model by the adaptive approaches. It is important to keep in mind that sustainable development is such form of development that is socially responsible, economically realistic and environmentally friendly (Tarkhanova, 2018). According to R. Perelet "the search for a new development model has led to the evolution of the sustainable development paradigm, the concept emergence of a "green" (ecological) economy and a deeper understanding that the economy and society should fit into natural systems and their limitations but not vice versa" (Perelet, 2011). Of course, the green economy is not a separate segment of the economy but it is its new adequate appearance (Dvoretskaya, 2017).

2. Literature review

Comparing the use of green economy in politics with conceptual approaches, it should be noted that the concept of green economy in the academic world has a long history. According to Loiseau, Saikku, Antikainen and others, "green economy" – term was firstly introduced by Pearce D. in 1989. This British researcher and his co-authors introduced it in response to the underestimation of environmental and social costs in the current price system (Loiseau et al., 2016). In particular, Pearce D. concluded that the "green" economy is the middle way to achieve sustainable development between the rejection of any economic growth or activity limitation and unrestricted free markets (Pearce, 1992). The expansion of the "green" economy concept has started and continues today due to British experts (Pearce, 1992; Barbier, 1987) in the field of environmental economics.

In fact, there is no generally accepted definition of a "green" economy. This is a rather controversial term that can be defined from various points of view, based on options for strategies depending on interests and worldview (Pattberg & Zelli, 2015; Mazzoni, 2020). Experts of the United Nations environmental protection organization (UNEP) have a fairly broad view of the green economy. They suggest define it as an economic activity that "increases the well-being of people and ensures social justice and significantly reduces risks to the environment (Towards a "green" economy, UNEP 2011). It is also the "green" economy definition in the Russian legal field in terms of sustainable development. If we consider this concept more narrowly, we can find that the "green"

economy includes some types and results of economic activity that contribute the life quality improving and living environment. It happenes with modernization and increasing production efficiency. According to Qingqing Weng, He Xu and Yijun Ji, all available definitions show that a "green" economy is an "umbrella" concept. It includes various consequences for growth and well-being or reducing efficiency and risks with natural resources using (Weng et al., 2018).

Today the "green" economy concept is positively perceived by Russian science. There is a variety of publications into this area in recent years (Lipina et al., 2017; Zhitovskaya, 2016; Chernomorova, 2016; Pchelincev, 2016). However, despite the large number of scientific publications devoted to the "green" economy, the problem of forming the "green" economic growth's model in Russia is studied insufficiently.

The importance of "green" growth is often discussed at the state level in Russia. According to the approved "Fundamentals of the state policy in the Russian Federation environmental development field for the period up to 2030", the strategic goal of the state policy in the environmental development field is to solve socio-economic problems. They ensure environmentally oriented economic growth.There is also a favorable environment preservation of biological diversity and natural resources.The claim to meet the needs of current and future generations, to realize the right of everyone to a favorable environment, strengthening the law in the environmental protection field and environmental safety are mantioned there (Fundamentals in state policy into the field of the Russian Federation environmental development for the period up to 2030). Moreover, the "green" theme has recently become an agenda for the Bank of Russia (Central Bank of the Russian Federation 2019). Global challenges related to climate change, accumulated environmental damage and reduced biodiversity are contributed to the creation and development of special institutions and financial instruments for sustainable development. They also include green bonds on foreign financial markets. It happens in accordance with the main development directions of the Russian financial market for the period 2019-2021. Russia can not stand by and must join the global process. This country must work out the national system's formation of financial instruments for sustainable development, the methodological and verification system's organization for responsible financing instruments.

This article discusses promising directions for the "green" economy development in Russia.It includs "green" investment issues and "green" growth assessment with the key indicators' using. We analyze the dynamics, the "green" investments' share and the structure of their funding sources. The study is based on an extensive amount of scientific literature. It allows us to make comparisons, provide relevant examples, extrapolate our ideas and results.

3. Materials and Methods

The methodology of the study was based on the methods of calculating the dynamics indicators characterizing the "green" economy data and data on "green" investment, as well as on a comparative analysis. In order to achieve the objectives, we used specific data from the Federal State Statistic Service in terms of green investment in accordance with the implementation of the investments' dynamics in fixed capital aimed at environmental protection and rational use of natural resources in 2000-2018. In order to analyze and assess the results of the green investment, we used the methods of comparing the calculated indicators of "green" growth of according to the Global Cleantech Innovation Index and data on the Global green economy index.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

4. Results and Discussion

Adopting a new paradigm for social development implies a transition to a circular economy. The above requires the reduction of greenhouse gas emissions, the utilization of wastes, and the use ofrenewable energy sources (Bazaluk et al., 2020). The "green" economy does not only recognize and take into account the importance of natural capital. It also provides for investments into environmental protection in order to preserve and increase it.

Climate change is a serious threat to the planet. The implementation of the Paris agreement on climate change in 2016 make it possible to draw the attention for investors and businesses to the necessity, inevitability and acceleration of the international transition to a "green" economy. Presumably, the implementation of this agreement can speed up the technological innovations' introduction and appropriate policies that allow investing in "green" and low-carbon assets, projects (International Finance Corporation 2016).

Moreover, huge investments are needed to finance and support projects for the environmental protection.Among them there are less carbon-intensive technologies and infrastructure. The question is how to make buildings and entire cities more water-and energy-efficient, based on wind and solar power stations, low-carbon transport and technologies (Peeters, 2005; Štreimikienė et al., 2016; Moumen et al., 2019).

Morgan Stanley Capital International (MSCI) experts dealing with environmental, social and managerial aspects have developed special tools for investors (see Table 1). They can implement their responsible investment strategies, excluding assets with high greenhouse gas (GHG) emissions from their portfolio.

Table 1. Special tools for implementing a responsible investment strategy

MSCI ESG CARBONMETRICS	quantitative information on GHG emissions and carbon intensity, reserves and potential emissions by type of fossil fuel for more than 8,500 companies.
MSCI ESG CLEANTECH METRICS	defines the prospects for the development of "clean" technologies in five areas: alternative energy; energy efficiency; "green" construction; pollution prevention; water resources management by the sustainable development principles.
MSCI CARBON PORTFOLIO ANALYTICS	evaluates the "carbon track" and "carbon risks" for portfolio of assets with benchmarking.
CARBON FOOTPRINT CALCULATOR.	allows you to generate statistics on GHG emissions at the button's touch (built on the basis of Microsoft Excel).
MSCI GLOBAL LOW CARBON AND ENVIRONMENTAL INDEXES	indexes that allow comparisons on the level of environmental responsibility and GHG.

Source: compiled by the authors

Sustainable or responsible investment as an investment model appeared with the introduction of the sustainable development concept in 2012 (United Nations Conference on Sustainable Development 2012). The purpose of this investment is not only to generate income for the investor, but also to create positive social changes, reduce the negative impact on the natural environment with ethical standards (Ministry of Finance of the Russian Federation 2017).

It is significant that the practice of socially responsible investment in Russia has not yet received proper development. In particular, a national regulatory system and a strategy for setting standards on socially responsible investment are not established. At the same time, some Russian companies are already acting as participants in the responsible investment's field.

Regular measures' implementation aimed at nature protection and construction of treatment facilities are required to improve the environment and further reduce emissions of harmful substances into the atmosphere.These measures require huge investments in the " green " economy.

There are some priority sectors for "green" investment in the global aspect (see Fig. 1) in accordance with the concept of UNEP. This organisation promotes actively the "green" model formation of economic development. They are: forest sector (afforestation strife); agriculture (developing sustainable management); water resources sector (solving water supply problems and improving water consumption efficiency);" green "fishery (overcoming a sharp drop in fish stocks); energy sector (the transition to alternative energy sources and production, increase of its use efficiency); industrial production (eco-efficiency increasing); green transport (development of environmental and energy-efficient transport modes); eco-tourism (the "green " infrastructure development, new types of eco-tourism, maintenance of biodiversity); "green" construction (construction of new "green "   buildings and existing buildings' renovation).
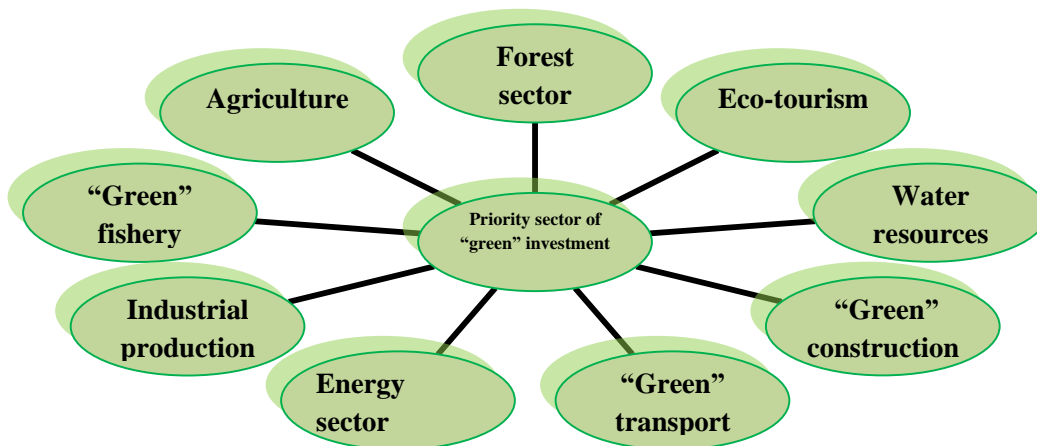
Fig. 1. Priority sectors of "green " investment
Source: compiled by the authors

In our opinion, the alternative energy is the foundation of "green" growth in Russia among the represented sectors. It is due to:
- firstly, the importance of the energy sector in the economy. It plays a fundamental role into the economic development and national security of the country. The alternative energy sources development is promising and highly perspective. It is despite the fact that the territories and subsoil of

Russia are quite rich in energy resources. This trend is very characteristic and significant for the Federal regions that use imported fuel;

- secondly, the increasing trend of depletion into the most affordable and profitable reserves of classical energy resources;

- thirdly, global climate changes and the need to reduce greenhouse gas emissions, the growth of which is caused by man-made emissions from energy sector facilities.

Analysis of the dynamics into alternative energy development in Russia shows that our country is currently far behind not only the leading countries but also the Eastern Europe countries. There is a worldwide rapid growth of renewable energy sources (RES). The RES share in energy production for the period of 2003-2018 increased from 2% to 10%. It is expected to 11.2% in 2020. The alternative energy share in the Russian energy sector was approximately 0.3% in the installed capacity of the Russian UES and 0.1% in the structure of electricity generation in 2018.

Today, the main problem in the modern alternative energy development in Russia is the low level of its financing. According to the forecasts of the international energy agency (IEA), Russian energy needs investment in the amount of $2.7 trillion for the period from 2014 to 2035.

Examining the countries' experience that have achieved impressive success in the field of "greening" the economy, we can note that environmental costs were: in Germany – 0.6% of GDP, in the Netherlands-1.4% of GDP, in France-1% of GDP, in Japan-1.2% of GDP. As for Russia, the share of environmental protection costs has not changed much since 2009 (0.7% of GDP). According to some experts, it is necessary to spend at least 1.3% of GDP on forming a "green" finance system every year in Russia to achieve significant success into this field (Panda, 2017).

According to Rosstat data, the results into the field of the "green" economy investment in Russia are significantly demonstrated by the dynamics of the investments' volume in fixed capital. They were aimed at environment protection and rational use of natural resources in 2000-2017. Figure 2 illustrates this process over the past 18 years.

The studied period of 2008-2010 shows a negative trend. It is characterized by a relative increase in "green" investments. At the same time, Russia tried to maintain the priority of investments in fixed capital aimed at the environmental protection and rational use of natural resources even in the crisis years (2008-2009). The dominant volume of investments in fixed capital aimed at environmental protection and rational use of natural resources during the analyzed period was in 2014.
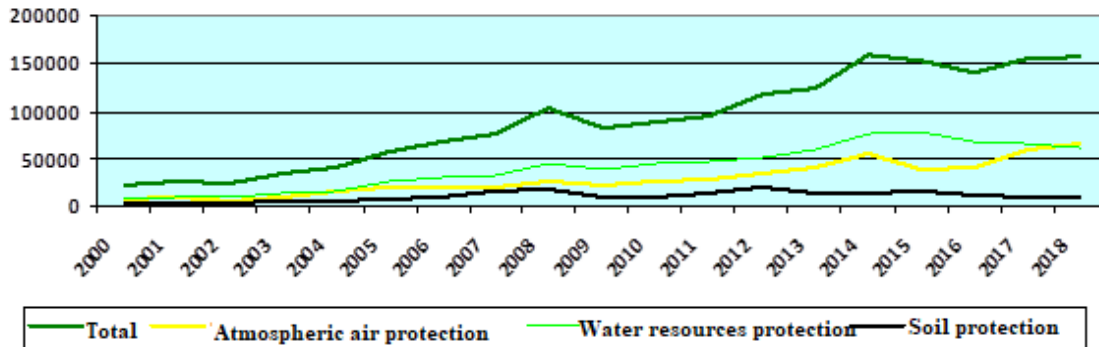
Fig. 2. Investments' dynamics in fixed capital aimed at environmental protection and rational use of natural resources in 2000-2018, million rubles.
Source: compiled by the authors, based on the data of Federal State Statistic Service of Russia

It is important to note that the main amount of funds during the study period was mainly addressed to the water resources' protection. The year 2018 has become more significant due to changes into existing trends in terms of investment directions. The investments in air protection have become the most significant.

The structure of financing sources for "green" investments is specific in Russia. It is significantly that the basic flow of "green" investments in Russia is provided by the own enterprises funds' expenses in contrast to foreign countries. The main investors of "green" investments are the specialized manufacturers and the public sector (see Fig. 3).
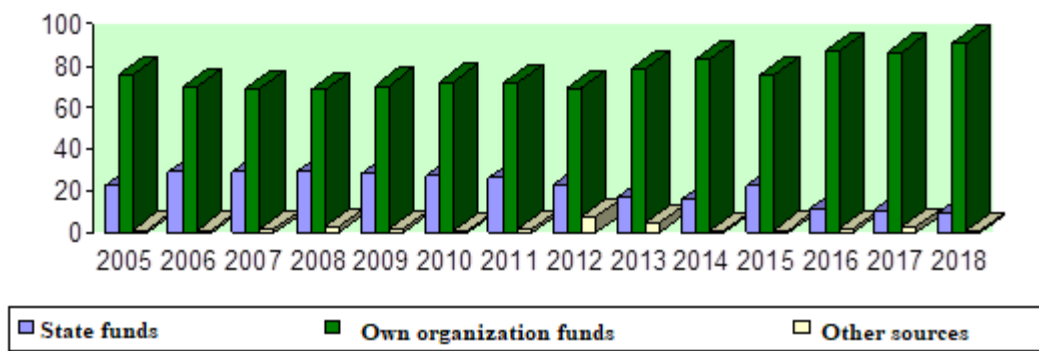
Fig. 3. Sources' structure for "green" investments' financing in Russia in 2005-2018, %
Source: compiled by the authors, based on the data of Federal State Statistic Service of Russia

In the study's continuation about the "green" investments in Russia, the attention is drawn to the peculiarities of their distribution by the economic activity type. The priority of the most "green" countries is investment in the production and distribution of electricity, gas, water and manufacturing (100% of total green investment). Unlike of them, the metallurgical production, coke and petroleum

products' manufacturing, chemical production lead in Russia. In addition, the assessment for "green" investments in the regional aspect shows their extremely uneven placement on the Russian territory.
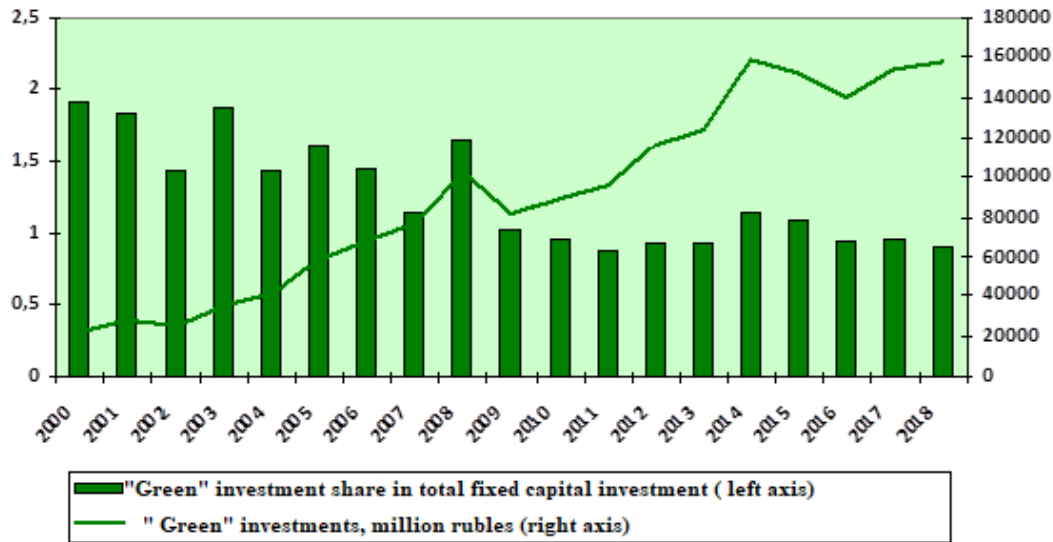
Fig. 4. Total "green" investment dynamics and "green" investment share in total fixed capital investment in Russia for the period 2000-2018.
Source: compiled by the authors, based on the data of Federal State Statistic Service of Russia

Figure 4 illustrates the total volume dynamics of "green" investments in Russia. We can see that the "green" investments in Russia occupy a fairly low share of investments into the fixed capital in contrast to European countries. This share has been constantly decreasing since 2000.

The movement towards sustainable economical development determines the need to evaluate certain countries' achievements in the field of "green" economy. It can be made by using various qualitative macro-indicators for creating environmental ratings and rankings. Today there are some indicators, the most informative from the point of view of the effectiveness into the "greening" economy implementation's process. They are: global index of innovation in environmentally friendly technologies; efficiency index action in the field of climate change; the index of environmental efficiency; environmental track; environmental vulnerability index; low-carbon economy index; environmental policy rigidity index; global green economy index (OECD 2018).

Russia took the 39th place in 2017 (see Table 2), the input and output of innovations was significantly lower than the average rate in the world, according to the countries' rating on the global index of innovations in the environmentally friendly technologies' field (GCII). According to the global index of innovation in the environmentally friendly technologies' field, Russia lacks a strong entrepreneurial culture and orderly structure for supporting the national innovation ecosystem. The country's weakness is in innovation drivers related to the environmentally friendly technologies. It is particularly evident in the regulatory system that Russia does not support innovation in the environmentally friendly technologies' field. There is the lack of specific industrial clusters in the environmentally friendly

technologies' field and the absence of any private local investors in environmentally friendly technologies. The lack of successful startups is in contrast to the small amount of venture capital funding in Russia. It indicates strong research in the field of clean technologies and intellectual property protection. There were 1,279 patents for technologies related to environmentally friendly technologies in 2013. It does not lead to any significant commercial clean technologies in Russia. The evidence is into the lack of activity in the clean technologies' field and investments (GCII). However, the country shows relative confidence in the energy sector.

Table 2. Ranking of countries on the global innovations' index in the environmentally friendly technologies' field in 2014 and in 2017.

2014			2017		
Ranking position	Country	Indicator value	Ranking position	Country	Indicator value
1	Israel	4,34	1	Denmark	4,07
2	Finland	4,04	2	Finland	3,96
3	USA	3,67	3	Sweden	3,86
4	Sweden	3,55	4	Canada	3,76
5	Denmark	3,45	5	USA	3,59
………….	………….	…………….	…………….	…………….	…………….
36	Mexico	1,15	36	Argentina	0,84
37	Poland	1,03	37	Bulgaria	0,83
38	Bulgaria	1,01	38	Saudi Arabia	0,67
39	Greece	0,97	**39**	**Russia**	**0,65**
40	**Russia**	**0,81**	40	Indonesia	0,60

Source: compiled by the authors, based on the data of Global Cleantech Innovation Index (GCII)

The Global green economy index (GGEI) is an important indicator of the effective "greening" process implementing by the countries. It was the first "green" economy index released in 2010. This index is now the most widely used product at the international level. It is used by the policy makers, international organizations, civil society and private sector. Like many indexes, GGEI is used to evaluate performance and to inform about areas that need improvement. It also demonstrates to various stakeholders how they can contribute to progress. The GGEI is particularly relevant in today's realities. It is due to the countries seeking to implement new emission reduction and sustainable development. They will need data to determine the best method to a low-carbon economy (see Fig. 5) (OECD 2018).

Fig. 5 illustrates the difference in the global green economy index (GGEI) in different countries in 2018. You can see that the leading positions belong to Sweden, Switzerland, Iceland and Norway, while Russia and Poland lag behind.
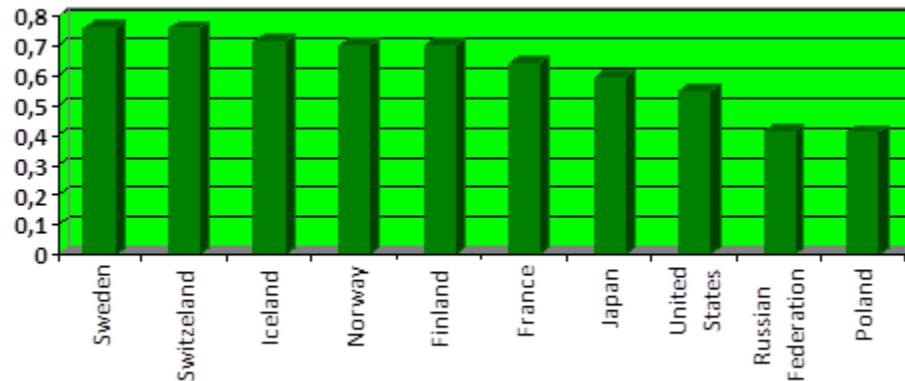
Fig. 5. Global green economy index (GGEI) in different countries in 2018
Source: compiled by the authors, based on the data of Global green economy index 2018

As noted above, only a few Russian companies currently participate in global initiatives into the field of sustainable development and green finance (Tarkhanova et al, 2020). A good example is the association of more than 50 participants in the Russian network of the UNO Global compact. It includes large companies, small and medium-sized businesses, business associations, public organizations and academic institutions from 16 Russian regions (Vnesheconombank, PJSC "Norilsk Nickel", PJSC "Severstal", JSC "RUSAL", PJSC "OC"Rosneft", PJSC "LUKOIL" and others). The UNO global compact network was launched in Russia in 2008. The UNO Global compact participants' activities are based on the concept of sustainable development. It combines three main areas: economic, social and environmental area. Several Russian companies on their information Internet portals declare the reports' preparation on the standards of sustainable development-GRI (Ministry of Finance of the Russian Federation 2017).

Vnesheconombank (VEB) is one of the leaders into the Russian financial market in the field of corporate social responsibility and sustainable development. Here is also Sberbank of Russia, Atomenergosbyt and other companies over the past years. Vnesheconombank (VEB) has significant capital investments in "green" investments. Vnesheconombank is the chairman and leader of the UNO global compact network since 2013. Today, Vnesheconombank considers a number of projects that belong to the "green" category. There are initiatives in the field of solar and wind energy, solid municipal wast's disposal and "smart" electric networks' creation. Vnesheconombank considers the green direction in its activities as a tool for improving export competitiveness. It is a platform for interaction with national and international development institutions. Special green finance tools are developed together with the Bank of Russia, the Moscow Exchange and market participants.

There is no doubt that in Russia, the importance of the "green" economy in general and of clean energy in particular will increase as in the rest of the world. According to certain estimates, in 2025, the global market for environmentally friendly equipment will reach 4.4 trillion euros (about $ 6 trillion). It will be more than 30% of average annual growth for the "green" economy and an increase in its contribution to

world GDP to 6-7%. Russia plans to use revolutionary technologies in the energy saving field, including new nanotechnology in order to reduce emissions of harmful substances. There is no doubt that the innovative model for Russian energy development and increasing the energy efficiency of the country's economy will become a strategic directions to the" green " model of the country's economic development. It is important to note the active development of renewable energy sources (RES) in Russia. There are solar and wind generation, small hydropower and biomass energy production. Moreover, the main strategic objectives for the "green" economy development in Russia will be: healthy environment; environmentally safe production; efficient environmental sector of the economy in the nearest future.

Conclusions

The conducted study of the "green" economy development in Russia has showed that the relative growth of the "green" investments was recorded in the period from 2000 to 2018. According to the indicators of "green" growth, Russia tries to maintain the priority of "green" investment. Russia remains significantly behind the leading countries of the world. A characteristic feature of the "green" investment system in Russia is noted. This feature is related to the structure of financing sources for "green" investments. In particular, the main financing is provided by the enterprises' own funds, rather than by the state and specialized manufacturers. This problem forms a key component of the further economy development. It is the adjustment for the current model of economic development with the mandatory participation for all interested parties. Today there are some key problems that hinder the development of "green" investment in Russia. They are: the lack of a legal framework for regulating "green" investment, a system of state support for "green" investments' attracting and a system for "green" securities' verifying. The presented considerations allow to conclude that in order to achieve the goal of creating a "green" economy in Russia, it is necessary to apply a systematic and comprehensive approach. It will eliminate all obstacles and mobilize financial resources to ensure sustainable development.

References

Bazaluk, O.; Havrysh, V.; Nitsenko, V.; Baležentis, T.; Streimikiene, D.; Tarkhanova, E.A. Assessment of Green Methanol Production Potential and Related Economic and Environmental Benefits: The Case of China. Energies 2020, 13, 3113. https://doi.org/10.3390/en13123113

Barbier, E.B. 1987. The concept of sustainable economic development. Environmental conservation. *Environmental*, 14(2): 101-110 https://doi.org/10.1017/S0376892900011449

Dvoretskaya, A. E. 2017. Green financing as a modern trend in the global economy. *Academy's Herald*, 2: 60-65. Retrieved from http://www.vestnik-mosap.ru/archive/2017/2/vestnik_2-2017.pdf

Fundamentals in state policy into the field of the Russian Federation environmental development for the period up to 2030. Retrieved from http://base.garant.ru/70169264/

Global green economy index. 2018. Retrieved from https://dualcitizeninc.com/global-green-economy-index/

Zhivotovskaya, I. G.; Chernomorova T. V. 2016. "Green economy" as a global development strategy in the post-crisis world: Reviews; Retrieved from http://inion.ru/site/assets/files/2523/2016_so_zelenaia_ekonomika.pdf

Green finance: an agenda for Russia. Diagnostic note. 2017. Retrieved from https://m.minfin.ru/common/upload/20181102_Green_finance.pdf

"Green" investments: the instructions for use. Brief reference. 2017. Retrieved from https://www.minfin.ru/common/upload/library/2018/06/main/2017_instructions.pdf

International Finance Corporation 2016. How can banks seize opportunities in climate and green investment. Retrieved from https://www.ifc.org/wps/wcm/connect/65457abe-0e4f-4dc2-80e6-725f696c4c22/EMCompass+Note+27+Banks+and+Climate+Finance+FINAL.pdf?MOD=AJPERES&CVID=lBMsNWE

Lipina, S. A.; Agapova, E. V.; Lipina, A.V. 2018. Development of the green economy in Russia: opportunities and prospects. Moscow, LENAND. 328 p.

Loiseau, E., Saikku, L., Antikainen, R., Droste, N., Hansjürgen, B., Pitkänen, K., Leskinen, P., Kuikman, P., Thomsen, M. 2016. Green Economy and related concepts: an overview. *Journal of Cleaner Production*, 139:, 361-371. https://doi.org/10.1016/j.jclepro.2016.08.024

Main directions to the development of the Russian Federation financial market for the period 2019-2021. Retrieved from https://www.cbr.ru/Content/Document/File/71220/main_directions.pdf

Mazzoni, F. 2020. Circular economy and eco-innovation in Italian industrial clusters. Best practices from Prato textile cluster. *Insights into Regional Development*, 2(3): 661-676. https://doi.org/10.9770/IRD.2020.2.3(4)

Moumen, Z., El Idrissi, N.E.A., Tvaronavičienė, M., Lahrach, A. 2019. Water security and sustainable development. *Insights into Regional Development*, 1(4): 301-317. https://doi.org/10.9770/ird.2019.1.4(2)

OECD. Green Growth Indicators. 2018. Retrieved from http://www.oecd.org/greengrowth/green-growth-indicators/

Panda, P. 2017. Green Bond: A Socially Responsible Investment (SRI) Instrument. *Research Bulletin*, 43(1): 97-113.

Pattberg, P. H. & Zelli, F. (Eds.). 2015. Encyclopedia of Global Environmental Governance and Politics. Edward Elgar Publishing. Retrieved from https://portal.research.lu.se/portal/files/36068087/PATTBERG_ZELLI_Front_Matter.pdf

Pearce, D. 1992. Green economics, Environmental 1(1): 3-13. Retrieved from http://www.environmentandsociety.org/sites/default/files/key_docs/pearce_1_1.pdf

Peeters, H. 2005. Sustainable development and the role of the financial world. In the World Summit on Sustainable Development Springer, Dordrecht. https://doi.org/10.1007/1-4020-3653-1_11

Perelet, R. A. 2011. Directions of the "green growth" strategy. *Eurasian Economic Review*, 1, 98-104. Retrieved from http://www.rospromeco.com/expertnoe-mnenie/28-analytic/expertnoe-mnenie/94-mnenie-7

Principles of sustainable development in the activities of financial development institutions and international organizations. VEB quarterly bulletin. 2016. Retrieved from https://xn--90ab5f.xn--p1ai/common/upload/files/veb/analytics/sd/2016q1.pdf

Qingqing Weng; He Xu and Yijun Ji. 2018. Growing a green economy in China. *IOP Conference Series: Earth and Environmental Science*, Vol.121, November 20-22, Sanya, China. https://doi.org/10.1088/1755-1315/121/5/052082

Štreimikienė, D., Strielkowski, W., Bilan, Y., Mikalauskas, I. 2016. Energy dependency and sustainable regional development in the Baltic states: A review. *Geographica Pannonica*, 20(2), 79-87. https://doi.org/10.5937/GeoPan1602079S

Tarkhanova, E.A. 2018. Innovations and sustainability in the financial and banking sectors. *Terra Economicus*, 16(2), 75-82. https://doi.org/10.23683/2073-6606-2018-16-2-75-82

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Tarkhanova, E.; Fricler A.; Baburina N. 2020. Green Economy in Russia: Leadership and Financial Aspects. *"5th International Conference on Social, Economic, and Academic Leadership 2019".* Vol. 386. September 27-28*,* Prague, Czech Republic, 197-203 https://doi.org/10.2991/assehr.k.191221.198

The future we want / Resolution adopted by the UNO General Assembly on July 27 2012. Retrieved from https://rio20.un.org/sites/rio20.un.org/files/a-conf.216-l-1_russian.pdf.pdf

The Global Cleantech Innovation Index (GCII). Retrieved from https://i3connect.com/gcii/country_profiles

Towards a "green" economy: method to sustainable development and poverty exclusion. Summary report for representatives of power structures. Nairobi: UNEP. 2011. Retrieved from http://all62.jp/ecoacademy/images/15/green_economy_report.pdf

Elena TARKHANOVA is the Ph.D. in Economics, Associate Professor, Honorary Member of the Interregional Public Organization "League of Higher School Teachers". Winner of the grant competition of the Vladimir Potanin Scholarship Program 2019/2020. Research interests: green economy, innovation and sustainable development, sustainability of banking institutions.
ORCID ID: orcid.org/0000-0002-8292-4842

Elena CHIZHEVSKAYA is the Ph.D. in Economics, Associate Professor Department of transportation of hydrocarbon resources, Institute of transport, Industrial University of Tyumen. Research interests: regional economy, priorities for the development of the territory.
ORCID ID: orcid.org/ 0000-0003-0158-3538

Anhelica FRICLER is the Ph.D. in Economics, Associate Professor, Honorary Member of the Interregional Public Organization "League of Higher School Teachers". Research interests: public finance, green economy, small business.
ORCID ID: orcid.org/0000-0003-0077-1115

Natalia BABURINA is the Ph.D. in Economics, Associate Professor, Independent author. Research interests: human development, quality of life, welfare, well-being, innovation, green economy.

ORCID ID: orcid.org/0000-0002-6970-0449

Svetlana FIRTSEVA is the Ph.D. in Economics, Associate Professor Department of Economy in the construction, Institute of service and industry management, Industrial University of Tyumen. Research interests: project management and financing, business value management, property management.
ORCID ID: orcid.org/0000-0003-0341-6477

ENTREPRENEURSHIP AND SUSTAINABILITY CENTER

Publisher
http://jssidoi.org/esc/home

enterprise europe network
Business Support on Your Doorstep

OASPA

Scopus

Web of Science

Clarivate Analytics

ENTREPRENEURSHIP SUPPORT WAYS AFTER THE COVID-19 CRISIS[*]

Manuel Chaves-Maza [1], Eugenio M. Fedriani Martel [2]

[1,2] *Pablo de Olavide University, Crta. Utrera Km.1 41014, Sevilla, Spain*

E-mails:[1] mchaves@upo.es ; [2]efedmar@upo.es

Abstract. The impact of the Covid-19 on Europe economy has been similar to that produced in the 2008 crisis, even with worse long-term consequences. Most governments have implemented recovery plans similar to those that were then implemented. However, there are differences in the economic impact that require different methodologies which focus on the microenvironment. Entrepreneurs' sponsorship may help to recover the current socio-economic situation. Simultaneously, technological progress in Artificial Intelligence and Big Data allows the analysis of vast amounts of information and support decision making. This paper shows a brief introduction of entrepreneurship policy in twenty countries after the irruption of the Covid-19 to contextualize, and applies Artificial Intelligence to examine factors whose influence is strong in the survival rate of entrepreneurs within a public support program. Specifically, two types of artificial networks are used: self-organizing maps and multilayer perceptron (respectively, SOM and MLP). After the application of neural networks on a data set of 2,221 entrepreneurs from Andalusia (Spain) and with 769 variables taken during the recovery after the crisis from 2008 to 2012, the prediction in the probability of entrepreneurial survival and business success is shown to be realistic in more than 98% of individuals analysed.

Keywords: entrepreneurship; sponsorship; artificial neural networks (ANN); self-organizing maps (SOM); multilayer perceptron (MLP)

1. Introduction

The policies carried out in the first half of 2020 and proposed by the governments for the recovery of the economy have been very different if we look at the countries of the European Union and associated with it. After the arrival of the first case of Coronavirus in Europe on January 24 (Rothe et al., 2020) and the first reactions to

control the spread of the disease, in such countries as France, Spain or Italy there has been one of the biggest falls in the economy in recent times, the rest of the reports followed world levels like USA or UK. The International Monetary Fund (IMF) now foresees a global recession of 3% in 2020 and a rebound of 5.8% in 2021. Still each month of confinement and isolation expansion has a direct impact on the economy and entrepreneurs in all these countries. However, if we compare this crisis with that of 2008, there is one issue worth noting: the speed and magnitude of the response from central banks and governments. Table 1 shows the distribution of total cases by country, the number of recovered, active cases and deaths, showing how it has affected some of the leading economies worldwide. Within a few weeks of the crisis, except for Russia and Turkey, most of the nine emerging economies in Central and Eastern Europe have already requested emergency assistance from the IMF. Italy and Spain, the third and fourth economies in the eurozone, were practically paralyzed as the two countries most affected by the pandemic; and other large economies such as Germany and France have applied severe restrictions on movement and activity.

Table 1. First countries affected by coronavirus according to data from May 17 2020, ordered by the number of deaths.

Country, Other	Total Cases	Total Deaths	Total Recovered	Active Cases	Serious, Critical	Tot Cases/ 1M pop	Deaths/ 1M pop
World	4,750,403	313,805	1,830,514	2,606,084	44,796	609	40.3
USA	1,509,422	90,142	339,572	1,079,708	16,248	4,563	273
UK	240,161	34,466	N/A	N/A	1,559	3,54	508
Italy	224,76	31,763	122,81	70,187	775	3,717	525
Spain	277,719	27,65	195,945	54,124	1,152	5,94	591
France	179,365	27,625	61,066	90,674	2,132	2,749	423
Brazil	233,511	15,662	89,672	128,177	8,318	1,1	74
Belgium	55,28	9,052	14,63	31,598	371	4,772	781
Germany	176,45	8,027	153,4	15,023	1,203	2,107	96
Iran	120,198	6,988	94,464	18,746	2,705	1,433	83
Netherlands	43,995	5,68	N/A	N/A	346	2,568	332

Source: https://www.worldometers.info/coronavirus/ N/A: Not available.

Although we can draw a parallel between the financial crisis of 2008 and the health crisis of 2020, there are some characteristics of the latter that differentiate it and frame its peculiarities (Barcena, 2020):

- The world is facing unprecedented health and humanitarian crisis in the last century in an adverse economic context. Unlike the last financial crisis, this is not a financial crisis but of people, health and wellness.
- A war economy situation is indispensable for the role of the state and not the market, therefore the states are taking a central role in suppressing the virus and the risks that will affect the economy and social cohesion.
- Flattening the contagion curve requires measures that reduce interpersonal contacts and will generate economic contraction, will paralyze productive activities and destroy aggregate / sectoral demand.
- How not to flatten the economy: strict and effective compliance with quarantines and health measures public will be the most efficient and fastest way to reduce economic costs.
- International cooperation: the way out of the crisis will depend on the economic strength of each country, so therefore, given the asymmetries between developed and developing countries, the role of the UN, the

IMF and the The World Bank will be essential to guarantee access to financing, sustain social spending and maintain economic activity with innovative measures ("out of the box").

There are many channels through which an infectious disease outbreak influences the economy. How it affects micro, small and medium-sized companies are given by the perceived opportunities that are one of the aspects that most affect entrepreneurs and entrepreneurs, as happened after the 2008 crisis, where practically all countries saw they saw affected. As can be seen in Figure 1, Spain and Italy lost a good part of that positive perception, which was not recovered until practically six years later. In other economic powers such as the United Kingdom and the USA. This recovery was faster. However, dependence on the giant has increased since that date and there is a rise in China's importance in the world economy today (McKibbin & Fernando, 2020).
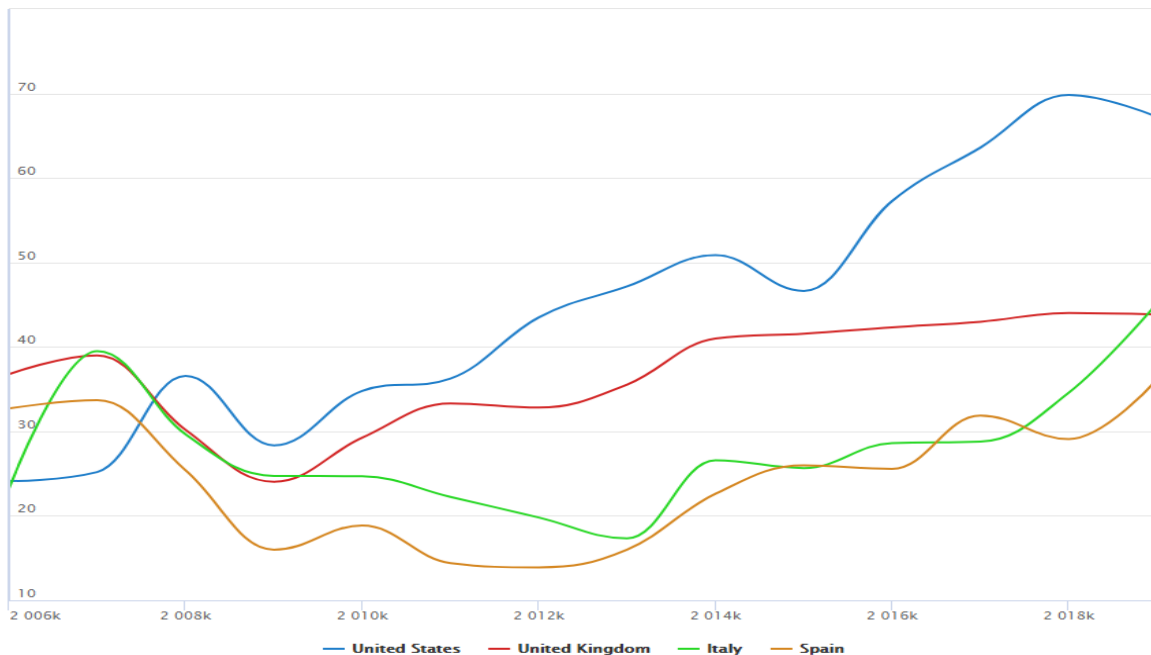
Fig. 1. Perceived opportunities. Percentage of 18-64 population who see good opportunities to start a firm in the area where they live.
Source: National Expert Survey of GEM Monitor database and own elaboration.

Even though that numerous mechanisms have been implemented to guarantee the sustainability of companies and avoid serial bankruptcies, the impact on turnover and profits will not be less violent. Returning to normal will take time. Thus, while equity valuations may appear attractive at these levels, they will undoubtedly not be sufficient to fuel a sustained increase, given the weak outlook for activity.

Having regional governance, with criteria of the geography of health, with discussions to reach colective agreements, are unavoidable pillars in a hyper-connected world. The lack of union, agreed on standards and intertwined health policies further weaken the weakness of the situation, and we know that a diseased body is an easy prey for any storm, be it COVID-19 or other (DiGiacomo, 2020). That's why most of the world's governments have sought support from the political forces and citizens to be able to carry out decisions that affect our life and activity as we knew it until then.

Analyzing Figure 2 from National Expert Survey GEM Monitor database (Gem, 2020), there was a cyclical evolution that happened to the indicators of openness of the internal market, support and government policies, the financing of entrepreneurs, the bureaucracy and rates, and government support programs. It is observed that the decline after the crisis 2008 was widespread in the leading countries that have been affected by the Covid-19 crisis, taking up to 8 years on some indicators to return to 2006 rates. Due to the parallelism of both crises, and given that according to many of the sources consulted indicate the deepest depth of this health crisis, governments around the world must prepare to rebuild this set of indicators and strengthen their economy by supporting the entrepreneurship environment.
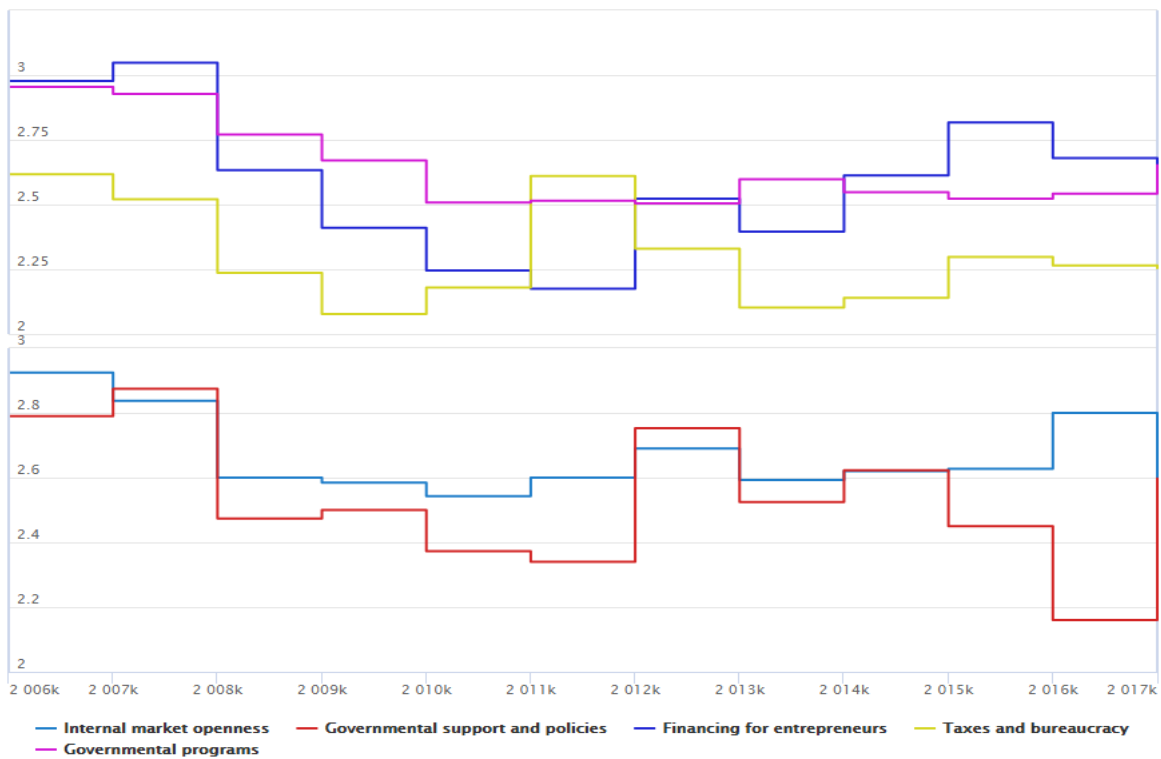
Fig. 2. Evolution of mean of entrepreneurship indicators: Internal market openness, Governmental support and policies, financing for entrepreneurs, taxes and bureaucracy and governmental programs of the ten more affected countries in the Covid-19 crisis (USA, Spain, Italy, UK, France, Germany, Brazil, Iran, Belgium and Netherlands).
Source: National Expert Survey of GEM Monitor data base and own elaboration.[†]

If we look at the preceding context in which the pandemic occurs, we see that it was not as favorable as we might think either. Young people have been hit in recent times by the crisis in a very significant way. Labor market conditions have changed, and they feel confused. There are guidance, counseling and support services for entrepreneurs. Still, they are not sure about the best way to help them. Despite the large amount of information

---

[†] Financing for entrepreneurs: The availability of financial resources "equity and debt" for small and medium enterprises (SMEs). Governmental support and policies: The extent to which public policies support entrepreneurship - entrepreneurship as a relevant economic issue. Taxes and bureaucracy: The extent to which public policies support entrepreneurship - taxes or regulations are either size-neutral or encourage new and SMEs. Governmental programs: The presence and quality of programs directly assisting SMEs at all levels of government (national, regional, municipal). Internal market openness: The extent to which new firms are free to enter existing markets

they have, they do not know which factors are positive and which are harmful, what effects will imply the inmediate decisions, what probability of success is hidden in each business sector, etc. As an alternative, often overly generalist training is imposed, in which very diverse contents are transmitted (Azizi and Mahmoudi, 2019; Sörensson and Bogren, 2019).

In this context, institutional support is considered essential. Concerning guidance to entrepreneurs, the importance of the intention to undertake is undoubted (Mamun, Che Nawi, Mohiuddin, Shamsudin and Fazal, 2017) and this fact makes it easier for entrepreneurs to be willing to receive training and prior support. However, it is not so clear that the other relevant factors can be taught to young people: first, because entrepreneurs cannot be oriented in one same way with different characteristics and different business ideas; second, because it is not well-known what leads to success in each case.

In this study, it is intended to combine one of the most critical crises suffered by humanity in recent decades with the use of the latest data analysis techniques since we are in the information age. The previous questions suggest the use of sophisticated tools, perhaps supported by Artificial Intelligence. Still, first it is convenient to ask if a computer program will be able to correctly guide an entrepreneur (or, at least, if computer science can help in this task to a support service for entrepreneurs). That's why it is necessary to develop a way to predict the success or survival of entrepreneurs based on the information available before starting the business venture. Once the probability of success is known in each case, it is possible to modify some of the input variables (maybe several times) and assess which is the best option for each entrepreneur.

Nowadays, the essential ingredients to enable the use of technology are already present: sufficient information, updated and validated, useful software for training artificial neural networks, entities (unusually public) interested in improving support services (Urban, 2019), etc. It remains unproven that the Artificial Intelligence-based methodologies are well-founded to solve this global problem.

Thus, the main objective of this paper is twofold: to verify if it is possible to use artificial intelligence to predict the success of entrepreneurs and to train an artificial neural network to do so, and use it in this context of world crisis caused by Covid-19.

Attend to the differences that have been observed in this current crisis concerning 2008 one, the new role for the state should be more stronger and supports those most affected which are micro, small and medium-sized enterprises that facilitate the development of the economy in which the International cooperation and interaction is limited. It is required not to fall into the errors that have been detected in the recovery from previous crises and to take advantage of all historical information to guide more efficiently and effectively entrepreneurs who intend to restore business models in this new environment. That's why, in the following sections, a brief analysis of the literature will be carried out to observe what factors to consider, and methodological review of artificial intelligence as SOM and MLP to build a success prediction model that allows a better performance of sponsorship in the reconstruction of the global economy.

1.2. Literature background

The entrepreneurial orientation can be understood as a set of processes and practices related to the decision making that enable the activity of both individuals and companies, which is an aspect that is positively associated with to profitability and growth of projects (Covin & Slevin, 1991; Ireland, Covin and Kuratko 2009; Wiklund & Shepherd 2005; Cuevas-Vargas, Parga-Montoya and Fernández-Escobedo, 2019).

If we analyze the set of capacities and qualities that define the entrepreneur, there are some of them linked to his attitude and the way of facing risk, reflecting his/her psychological and social profile (Al-Jubari, 2019). Although we try to reduce this risk, there are many other characteristics that maintain all their importance. According to the literature, these most relevant characteristics are the following: negotiating and commercial attitude (Douglas & Judge, 2001); ambition (Larrea & Ayerbe, 1996); positive mental attitude (Timmons & Spinelli, 1994); creativity (Hawkins & Turla, 1987); decision (Álvarez & Busenitz, 2001); social skills (Baron, 2000); initiative (Moskvina, 2013; Gibb, 1993); leadership (Anzola, 1997); planning (Sandberg, Robinson and Pearce, 2001; Stewart and Roth, 2001); tenacity (Rock, 1987); vision of the future (Filella, 1997). All these factors undoubtedly influence the success of the business project.

To carry out the present investigation, all factors that increase the sustainable competitive advantages of entrepreneurs (and, therefore, are key to their survival and growth) must be identified. Although there is no consensus on the definition of key concepts in entrepreneurship, the Theory of Resources and Capabilities maintains that the resources of the company influence the performance and organizational results, so that companies that have resources of superior quality will have greater benefits and greater possibilities of achieving sustainable competitive advantages (Peteraf, 1993). This idea provides an excellentclue to locate the most appropriate variables to measure the critical factors of entrepreneurship in each of the four classic approaches:

i. Within the "individual" approach, the prevailing variables are eare education, previous experience, intentions of the entrepreneur, entrepreneur attitude and age.
ii. In the "environment" approach: growth; structure; dynamism.
iii. In the "organization" approach: prior planning; social capital.
iv. In the "process" approach: focus and differentiation strategy; marketing ability.

In any case, to give a broader idea of what the existing literature contemplates and to justify the subsequent appearance of a complex model, next we list some factors that could be measured by other variables and that have also been considered critical factors in the business success, according to the literature (Mitchelmore and Rowley, 2010):

• Entrepreneurial skills: identification and definition of a viable market niche; development of appropriate products or services for companies to choose the market niche or product innovation; generation of the idea; surrounding analysis; recognize and envision taking advantage of opportunities; formulate strategies to take advantage of opportunities.
• Business and management skills: development of the management system necessary for the long-term functioning of the organization; acquisition and development of resources required by the company to operate; operational skills for business; previous involvement in the creation of other companies; managerial experience; familiarity with the industry; financial and budgeting skills; previous experience; direction style; marketing skills; technical skills; necessary skills in the industry; ability to implement the strategy (program development, budgets, procedures, performance evaluation); familiarity with the market; preparation of business plans; ability to achieve objectives; managerial skills.
• Competencies of personal relationships: development of the organizational culture necessary to guide the company; ability to delegate; ability to motivate other individuals and groups; hiring skills; skills for maintaining personal relationships; leadership skills.
• Conceptual and relationship competencies: conceptual competencies; organizational skills; interpersonal skills; skills to direct clients; ability to manage clients; mental capacity to coordinate activities; skills for written

communication; skills for oral communication; skills for decision making; skills for analysis; skills for logical thinking; negotiation skills; commitment capacity.

Despite the many variables of the previous lists, the characteristics of the entrepreneurs and their projects are not sufficient to predict business success. The environment not only affects the motivation of entrepreneurs and the generation of projects but also modulates the validity of the factors mentioned above: aspects that may be very relevant in an environment may not be significant in a different one. However, it is rarely possible to influence the environment, except through orientation and support for entrepreneurs. This research aims to justify that it is possible to estimate what will be the future result of an entrepreneur and use that estimate to optimize the processes of training, guidance and support.

1.3. Structure of the paper

Firstly, the data collection from the different available sources of information is explained, highlighting the database of the "Andalucía Emprende" Foundation. Several usual multivariate analysis methodologies are applied to these data, which serve to select the main variables that have a direct influence on the final variables that are to be optimized.

Secondly, the SOM methodology is applied to the data and the selected variables, grouping the cases according to their similarity in the set of variables studied. The groups obtained are analyzed and their relationship with the output variables is reviewed so that the profile of the entrepreneurs of each group can be characterized according to their probability of success, survival or failure. These groups are the basis for the efficient prediction of any probability since it requires a classification based on the a priori variables that are consistent with the variables (survival or success) that we want to estimate.

Thirdly, a MLP is trained and used to predict entrepreneurs' success. And finally, we reflect on how the results obtained can be useful to improve the probability of survival and success, based on the advice, the suggested training complements and the different types of public support offered.

2. Sample and methodology

The sample comes from the database of the "Andalucía Emprende" Foundation (AEF), which collects data on entrepreneurs from 1998. This information is taken in one of the regions with the most barriers and obstacles to entrepreneurship, during the time of the crisis from 2006 and recovery until 2013, which will help us to project the SOM and MPL models. The main descriptive statistics of this database can be found at "Relevant factors to optimize public services to support entrepreneurs and the survival rate of companies" (Chaves & Fedriani, 2018). The information it contains has been complemented by other databases of public access that are detailed below and that make it possible for the analysis to have a total of 769 explanatory variables:
• Data base from "Andalucía Emprende" Foundation: 238 variables of entrepreneurs. This research was supported by Pablo de Olavide University (Spain) and data was collected from this Foundation that participates in the European Erasmus for Young Entrepreneurs project through the project called MOVE YE.
• To consider the environment where the entrepreneur is located: 325 variables from the Institute of Statistics and Cartography of Andalusia (https://www.juntadeandalucia.es/institutodeestadisticaycartografia); 125 variables from the National Statistics Institute (https://www.ine.es/); 15 variables from the Cadastral Electronic Site (https://www.sedecatastro.gob.es).

• To consider the segment where the entrepreneur performs his activity: 250 variables from SABI Company Database (https://sabi.bvdinfo.com/ip/); 25 variables from Statistics of Foreign Trade (http://datacomex.comercio.es/); 16 variables from Statistics from the Central Mercantile Register (http://www.rmc.es/estadisticas/EstadisticaSocietaria.aspx).

The variables mentioned above have been classified into three groups, according to Schnabl (2010). Of these variables, the main ones that have been used for the design of neural networks are highlighted below, after performing the first screen according to their significance:

(1) Descriptive variables of the entrepreneur and the project: the level of studies of the entrepreneur before the start-up of the project (if there are several promoters, the mean is calculated); the legal form of the new company; type of activity carried out by the company; the investment planned in the budget presented within the business plan; the funding provided in the budget; the level of studies (if there are several promoters, the maximum is calculated); the age of the promoter(if there is more than one promoter, the average value is calculated); the number of full-time employees with whom the business project starts.

(2) Environment variables and public support: the contractual relationship with the "Andalucía Emprende" Foundation (classified as "incubation" or "pre-incubation"); the type of accommodation (office, warehouse or "no accommodation provided"); the incentives for creation or innovation (dichotomous variable); the number of support services received in the first three months of activity; the financial profitability of the environment; participation in a program to revitalize the local productive fabric (dichotomous variable); the economic indicator of the environment (aggregate index on the business fabric of the municipality in which the entrepreneur is located); if there is a forecast of employment that is generated by the entrepreneur within the business plan presented (dichotomous variable).

(3) Dependent variables and other variables linked to the interpretation of the model: business success (if it meets the objective defined at the beginning of its activity); failure (its survival is less than two years after its creation); the average value of added indefinite workers; the average value of added temporary workers; average billing of the project; the ratio between billing and project employees; relative financial profitability concerning companies in the sector; total investments made. About survival time, we must consider that there are cases of companies that meet short-term objectives of less than one year, in which case they would not fall within this denomination and would have to be analyzed separately (Morris, Schindehutte and Allen 2005; George & Bock 2011; Bruneel, Spithoven and Clarysse 2017).

In particular, the dependent variables in this third item are incorporated in order to have different ways to infer if each entrepreneur has achieved his initial objectives.

The techniques applied in this paper can be classified into two main groups located in the two corresponding phases of the study. First, multivariate analysis is used to select the relevant variables. Since the database has a large number of variables for each business project, it is convenient to distinguish between those variables that are significant and those that are not relevant for the type of research that is intended to be carried out. Subsequently, two different types of artificial neural networks are applied. The SOM technique is responsible for the unsupervised classification within the group of possible cases; this classification is essential to be able to predict later the probability of success, failure and survival of each individual because such estimation would only be useful if the groups generated on the basis of the "independent" variables behaved in a homogeneous way with respect to the "dependent" variables. Finally, with the aid of the definition of success, a MLP estimates the probability of success from the initial variables. The main tools used in this study, the neural networks (SOM and MLP), are described below.

SOM technique

Unlike the networks with supervised training (like MLP), the classification of the cases by SOM is carried out autonomously (without requiring the participation of the researcher), discovering common characteristics among the instances, regularities, correlations as well as categories in the input data.

Accurately, the SOM analysis of the data has been carried out to obtaining a first unforced classification of homogeneous groups that can serve to understand the behavior of entrepreneurs better and to justify the viability of using supervised neural networks for classification, simulation, adjustment and estimation. For the calculations, the "Kohonen" package of the R program was used, with a grid of 10x10, with several iterations of 500, with an Alpha learning rate of 0.05 to 0.01 and with 100 neurons. The SOM model was designed based on the set of all the prior descriptive variables, previously using classical multivariate techniques for the selection of variables. Among the methods used, the following stand out: (i) cluster analysis; (ii) factor analysis; (iii) logit analysis; (iv) structural equation models; (v) decision trees (Mangiameli, Chen and West, 1996).

Let us contextualize the technique used (SOM). It was developed in 1982, thanks to pieces of evidence discovered at the brain level by T. Kohonen. A SOM is an artificial neural network composed of two layers where a competition of neurons of the output layer takes place. This type of model is an unsupervised network because there is no external expert that indicates whether the neural network is operating correctly or incorrectly; this is consistent with the fact that no measurable output is available to which the neural network should tend. Consequently, in the training phase not only the weights of the winning neuron are updated but also the weights of neighboring neurons are modified, for which a neighborhood function is defined: $f(i,i*)$, where $i*$ is the so-called "winner neuron" (Lamedica *et al.*, 1996).

The goal of a SOM is to discover common characteristics, regularities, correlations as well as categories in the input data. The feature space is based on the physical disposition of the output neurons to model some of the characteristics of the input space. It is said, therefore, that the neurons must self-organize according to the stimuli (data) coming from the outside. In this sense, with the usual notation, if two inputs, x_1 and x_2, are close to each other concerning some measure in the input space and cause the activation of the output neurons, then y_a and y_b must be close to each other with respect to some type of composition or disposition of the output neurons (Curiel-Marín, Passoni, Olmedo-Moreno and Fernández-Cano, 2018).

Due to the final two-dimensional output, the SOM can be understood as a projection from a high-dimensional data space to a two-dimensional graph of neurons. The most common topologies of this type of network are rectangular and hexagonal (Aparanji, Wali and Aparna 2018), being the latter the one used in this work.
The proposed SOM method is divided here into two fundamental phases. First, a prototype is selected as the winner of a competition between all of them and then the winning prototype is moved to better represent the points that belong to it. In the first phase, a distance between the prototypes and a point of the set of examples is calculated. For the calculation of this value, distance measures such as, for example, the Euclidean distance can be used. Then the prototype approaches following the learning equations.

Supervised learning: MLP

The history of the MLP is, if possible, better known than that of SOMs because its origin is in the simple perceptron, with which it can be said that the theory of artificial neural networks began. In the 1960s, the problems that the simple perceptron had were evident, but it was not until 1986 when Rumelhart and other authors improved the training system of the first artificial neural networks to allow their use with more than one hidden layer.

A MLP is a neural network that trains similarly to the human brain: by trial and error. When designing an MLP, the number of layers and the number of neurons per layer are determined. One can also determine the type of neuron activation function and the training procedure. Each edge or arch (which connects two neurons of consecutive layers) has a weight, which can be initially set but will change with training. Broadly speaking, the training of a MLP consists in presenting to the system some patterns (or particular cases) of which the result is known. If the network is right in its forecast on a case, its weights are not modified (i.e. the network "does not learn"). If the network fails to forecast, its weights will be modified to get closer to the desired result. When this process has been repeated enough times, the network is considered to have been trained.

To prevent that the learning of the data (overtraining), the data set is usually divided into two or more pieces: one is used for training and others to validate if the network also works with other data set (different from those used to train).

In general, the MLP fits much better than classical multivariate analysis, but it is often difficult to interpret the model generated by artificial intelligence. Anyway, once the neural network is trained, it is proposed to analyze the model obtained to deduce information about the factors that influence survival, which would allow, for example, in our case, to find out how to optimize the support service.

The MLP we use is a multilayer perceptron, two-layer feedforward model enhancement. The first layer with 84 neurons and the second with 3, with a minimum training accuracy of 90%. In our case, two different procedures have been used to train the two-layer MLP.

The first training was done with the SPSS software. Here, 70% of the data was used for network training, 10% for validation and the remaining 20% for testing. Obviously, due to the stochastic nature of the training process, every time it is repeated, slightly different results appear (although all of them may be similar). This also occurs if another MLP is designed or other software is used to train.

Second, a model improvement MLP has been used. The combination rule used for categorical variables is voting and the number of component models for self-increase and aggregation is 10.

Self-documenting aggregation produces replications of the training data set by sampling with the repetition of the original data set. Create bootstrap samples of equal size to the original data set. That is, a "component model" is created from each replication. Together, these component models form an assembly model. The set model scores some records with a combination rule; the available rules depend on the level of measurement of the destination. The program used for this other training has been the IBM modeler. The method generates a set model through self-document aggregation, which generates several models to obtain more reliable predictions. It may take longer to generate and score sets than a standard model.

3. Results and discussion

A database of 769 variables was considered and, before the SOM analysis, a reduction in the number of variables was made through association analysis, a factorial study and other multivariate techniques, which allow us to identify which variables best explain the variable dependent within each category: descriptive variables of the entrepreneur and the project and environment variables and public support. Once a selection of 72 variables has been obtained, the SOM training is carried out.

Figure 3 shows the process of iterations in the SOM training. The average distance from each node to the nearby units shows, through the iterations, the expected progressive descent.
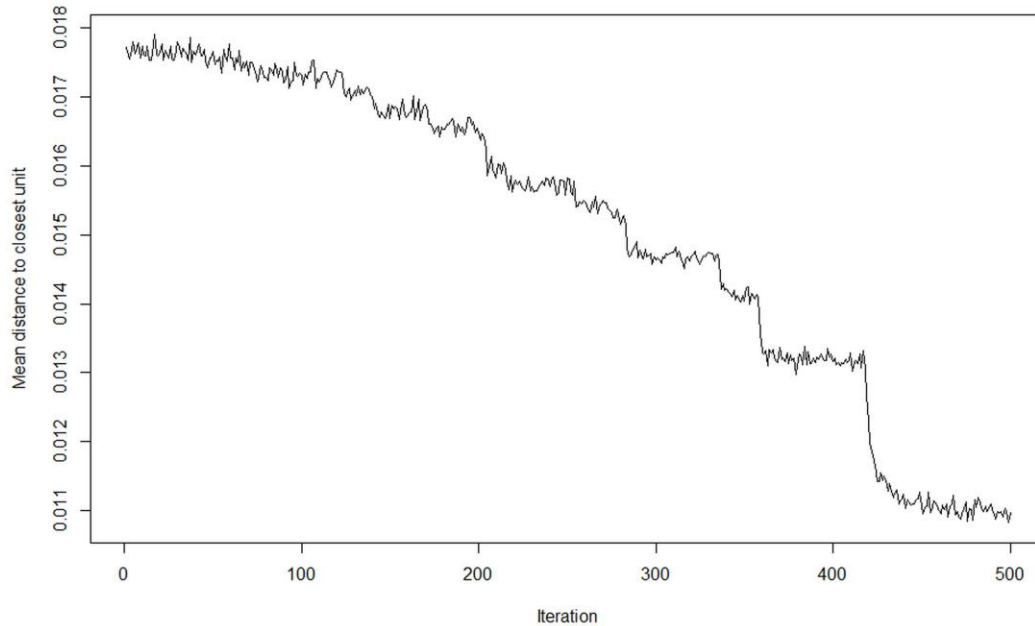
Fig. 3. The training process of the ANN. Source own elaboration
Source: own elaboration from AEF database.

If we look at the general distance map (Figure 4), where the distances between the nodes are shown, some differentiated zones can be seen. In general, the presence of nodes with a considerable distance means that there are very differentiated nodes that, therefore, will be more likely to belong to different groups.
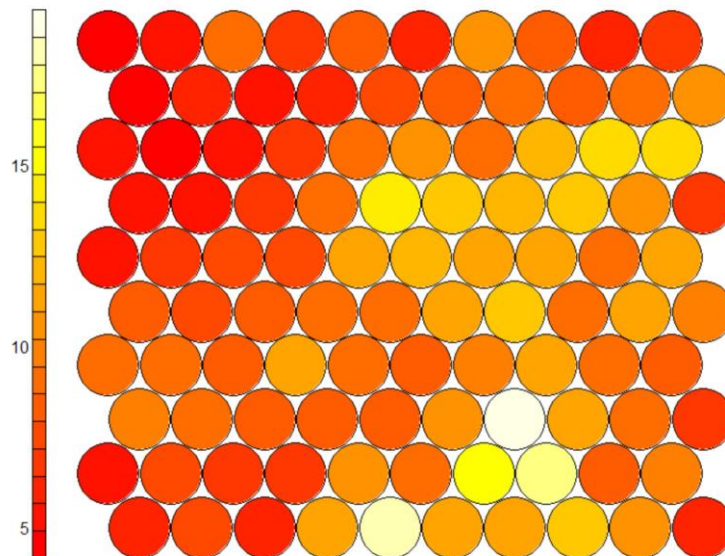
Fig. 4. Graph of SOM distances. Source own elaboration
Source: own elaboration from AEF database.

Figure 5 shows the values in each of the variables that have been used to train the network, although in this case it is not shown with the classic radial format but in a linear manner, because of the high number of variables. Note that nodes with a similar silhouette (which implies even values in the different variables), are within the same classification (that is, in the same group or "cluster"). For the conformation of the clusters the function "add.cluster" has been used within the R program available in the Kohonen statistical package.
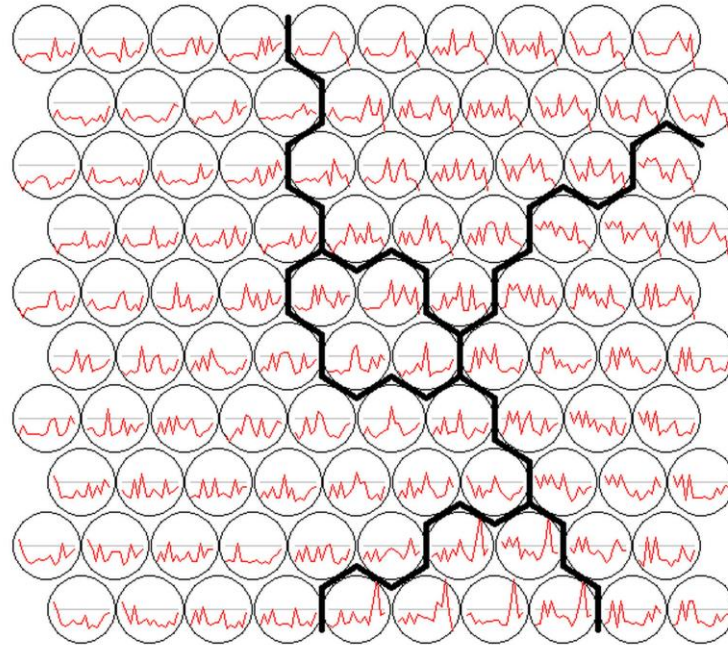
Fig. 5. Codes graph. Source own elaboration
Source: own elaboration from AEF database.

Figure 6 shows the case counts for each node. The group represented to the left is the most numerous and there are also some nodes marked with an asterisk, which implies that no case has been located within those nodes. Additionally, in Figure 5, the five clusters obtained through the application of SOM to the database of entrepreneurs in Andalusia are presented again, although more simply.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
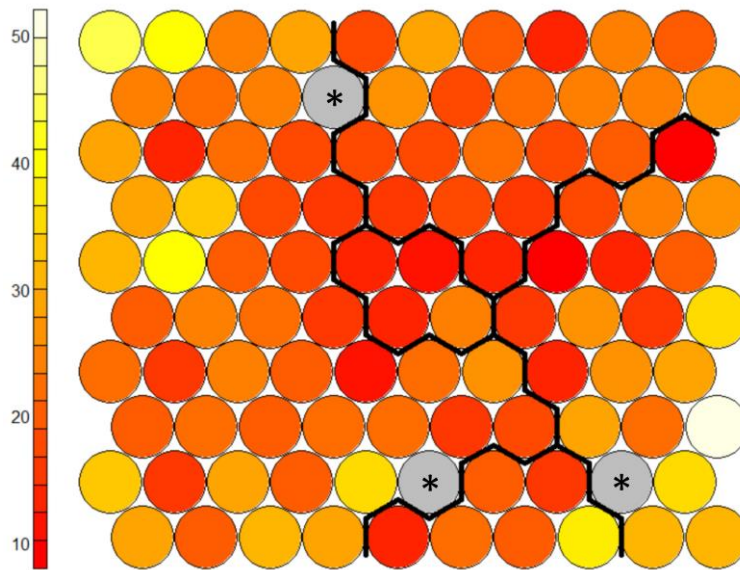
Fig. 6. Case counts per node. Source own elaboration
Source: own elaboration from AEF database

Grosso modo, it is observed that the clusters have the following characteristics which would be taken into account in order to predict the probability of success:
• *Cluster 1*: entrepreneurs without employment plan or impact on the local productive sector and accommodation.
• *Cluster 2*: entrepreneurs with an employment plan.
• *Cluster 3*: entrepreneurs who have a development plan, do not have an employment plan, but have an impact on the local productive sector.
• *Cluster 4*: entrepreneurs without an employment plan or incidence in the local productive sector and with accommodation (office) provided.
• *Cluster 5*: entrepreneurs without an employment plan, with an impact on the local productive sector and without accommodation (office) provided.

Table 2. Summary of descriptive statistics of the clusters

	Indefinite workers (average)	Temporary workers (average)	Mean gross sales	Gross sales/ employees	Relative financial profitability	Total investments
Cluster 1	1.97	2.31	99,925 €	43,932 €	27.20%	24,499 €
Cluster 2	2.93	3.05	120,655 €	46,393 €	72.80%	15,548 €
Cluster 3	2.55	1.73	90,536 €	73,136 €	18.90%	21,591 €
Cluster 4	1.65	1.77	69,241 €	42,011 €	34.80%	9,642 €
Cluster 5	n/a	n/a	n/a	n/a	n/a	n/a

Source: own elaboration from AEF database.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
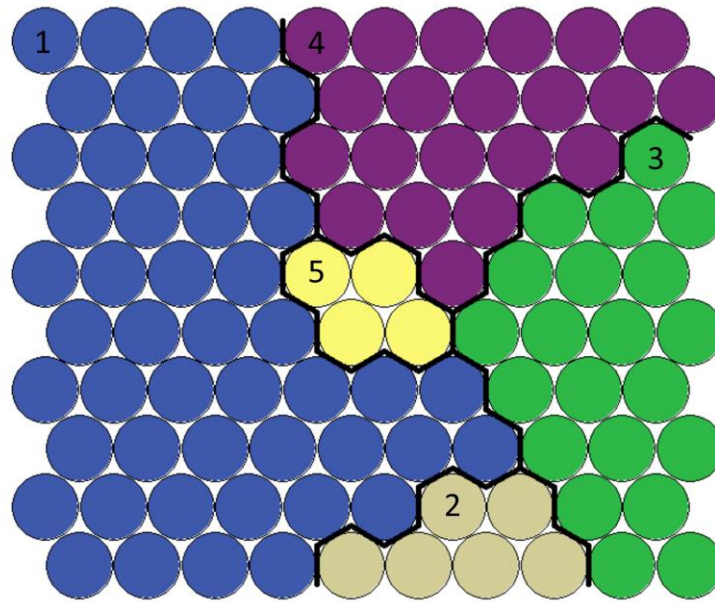
Fig. 7. Clusters obtained by SOM networks. Source own elaboration
Source: own elaboration from AEF database.

Table 2 specifies the behavior of each of the clusters concerning the dependent variables considered to validate the classification obtained (note that the data from cluster 5 are not sufficient to assess success since most of these cases have not survived two years).

When performing the statistical tests to verify that there is an association with a "success" variable (obtained from the previous dependent variables) in each of the clusters, it is observed that it can be accepted that there are significant differences between the obtained clusters (Table 3).

Since it is possible to use an artificial neural network to classify the data appropiately for the present line of research, likely, it will also be possible to train another neural network (for example, a MLP) to be able to estimate the probability of success of each individual that is going to start a business entrepreneurship project.

Table 3. Pearson's chi-squared test for association

	Value	df	Asymp. Sig. (2-sided)
Pearson chi-square	50.146	12	<0.0005
Likelihood ratio	48.708	12	<0.0005
Linear-by-linear association	0.932	1	0.334
N of valid cases	2,210		

Source: own elaboration from AEF database.

The first MLP was trained by data partition and with SPSS software. In this case, the neural network classified the cases according to Table 4.

Table 4. Classification of cases by MLP

Classification / MLP	Success	Survival	Failure	Total PML
Success	123	6	1	130
Survival	2	985	9	996
Failure	0	6	1047	1053
Total cases	125	997	1057	

Source: own elaboration from AEF database.

With the repetition of training several times, it was possible to get the trained network to succeed in its forecast on the set of tests 98.4% of times.

The next MLP training was obtained with a model of stability improvement by self-aggregation aggregation and through IBM modeler (see details in Table 5).

According to the resulting models, the most relevant variables are the sector; the probability of survival of the environment; the number of employees; the region; the number of support services. Note that during the orientation process you can act by modifying the project to choose the most convenient values in most of the variables listed above. I Variables such as the probability of survival indicate the importance of choosing the location for the first implementation of entrepreneurs. Others like the number of entrepreneurship support services received that detail the interest or involvement of the new entrepreneur in the project, clearly influences the venture's probability of success, not so much individually but as a combination of factors, which is one of the justifications for using SOM analysis and neural networks as a methodology for prediction of success.

Table 5. Pearson's chi-squared test for association.

Model Summary		
Training	Cross Entropy Error	479,809
	% of incorrect forecasts	8%
	Stop rule used	1 step
		consecutive without decreasing the error a
	Preparation time	00:03,1
Test	Cross Entropy Error	175,204
	% of incorrect forecasts	5,80%
Variable dependent: RNA_Éxito		
a. Error calculations are based on the test sample		

Source: own elaboration from AEF database.

Conclusions

Entrepreneurship is not only essential to reduce unemployment, but it is also critical to improve the competitiveness of the economy (Spulber, 2014; Mamun et al., 2017). In this context of global Covid-19 crisis in which the most efficient and effective mechanisms for economic recovery through entrepreneurship are required, this paper aimed to clarify if it is possible to support entrepreneurs by knowing a priori the probability of success of a business project based on the rest of the variables that affect the entrepreneur and his/her environment. A

technique based on artificial intelligence is adapted, by using self-organizing maps and a multilayer perceptron could make it possible.

After analyzing the context of the economic crisis in the first semester, considering differences of the current crisis concerning that of 2008, it has been observed that the role of the state has more weight and must take into account those most affected (micro, small and medium-size business). The opportunities perceived in the past financial crisis did not recover until after four years in most countries, except in those where the degree of government support and policies, financing for entrepreneurs and government programs were taken into account. The vast amount of historical information can no longer be wasted and we must use the new artificial intelligence techniques, avoiding general recipes for training and institutional support and being able to reconstitute the perceived opportunities of future entrepreneurs and, therefore, rebuilding the economy.

As previously cited, a replicable entrepreneurial success prediction model has been built today, based on two MLP and SOM techniques that have a hight capacity to take advantage of all this volume of historical information that is available on entrepreneurs. MLPs usually fit the data very well, but this is not proof that the model serves to predict in new situations (by overtraining). Therefore, it has been studied whether the data were likely to be grouped intrinsically and if this classification was related to survival and business success.

In the graph of SOM distances obtained, some differentiated zones can be observed. Nodes with a massive distance show highly differentiated cases and, therefore, will be more likely to belong to different groups, which behave differently in any attempt to predict success. Five groups of nodes were determined by the SOM trained, and the characteristics of the different groups revealed significant differences among them, in terms of the probability of failure (not survival), survival or success.

The differences in the probability of success among these homogeneous clusters seemed to be even independent of the definition chosen for this explained variable. If the explanatory variables are modified, the probability of success is affected. This is especially interesting if we consider simultaneously those variables that can be controlled from the point of view of the institutions that support entrepreneurs (assistance or accommodation, among others) as well as those variables linked to the environment where the project is to be located (one can study, for example, which location maximizes the future viability of the business project).

When developing the SOM, the variables that have been shown to affect more the prediction of the model are the following that there are significant differences in the five groups obtained at a 95% level of confidence:

•	Environment: local productive; employment plan; type of business accommodation; financial profitability of the environment; supporting services; economic indicators of the environment.
•	Entrepreneur and project: activity of the company; investment; financing; educational level; legal form; employees.

To achieve the most motivating results of the study (taking advantage of the possibilities of artificial neural networks), once the SOM groups have been obtained, a multilayer perceptron was designed with the entrepreneur variables and trained with the available data set. It helped the training to incorporate the "group" variable obtained by the SOM. This allowed us to model and make predictions about the probability of success of an entrepreneur, as well as to know the variations of probabilities when changing the values of the initial variables. The more influential variables became: the sector; the probability of survival of the environment; the number of employees; the province; and the number of support services.

We hold that it makes sense to apply this type of methodology in practice when sufficient data are available (in number and reliability) to train a neural network properly. Today, public support systems for entrepreneurs have abundant sets of adequate data; however, they do not usually take advantage of them, beyond the use that each support service worker makes individually (and, in many cases, subconscious). As has been seen in the present investigation, there are factors that condition the success of entrepreneurs and that can be modulated through the support service itself or the modification of the business project in question. Besides, it can be deduced that there is no single recipe for success, but that entrepreneurs can be classified according to their characteristics and their projects so that belonging to one of the groups implies that certain actions in the counseling will have a different effect of what is expected in cases belonging to other groups.

If we attend to this set of recommendations, to the question ways to support entrepreneurship after the covid-19 crisis, it is possible to perform as a joint and coordinated system that includes analyzes and decides according to the following considerations:
- The combination of variables that the entrepreneur brings in.
- The optimal business segment to carry out his activity.
- The most favorable values of the investment budget.
- The training, capacities and technical characteristics that the entrepreneur must have or promote.
- The type of service we must provide you throughout your career.
- The support institution will define all these factors through the system of maximizing the expected benefit built on the basis of the neural network system explained in this study.

In conclusion, an unsupervised artificial neural network generated groups compatible with an eventual classification of entrepreneurs according to their level of success. Hence, there is non-subjective information in the data that determines the probability of business success. Thanks to the SOM technique, it has been possible to establish groups where it is easy to classify the cases of entrepreneurship a priori and which seem to behave in a significantly different way from the rest concerning the variables that are often used to measure business success. Besides, by using other quite reasonable estimation techniques like MLP, it is possible to obtain really good fits. In fact, the network was trained several times and all of them came out something similar, which supports the reliability of the model. Therefore, it is realistic to know in each case the influence of relevant factors related to the advice for increasing the chances of success of the entrepreneurs. This final model will be the basis for implementing an artificial intelligence system to improve the orientation of future entrepreneurs.

As for recommendations for further research, a functional relationship could be obtained in any other region, between the initial variables (which describe the characteristics of the entrepreneur, the project, the environment, as well as the type of public service received) and the final variables of success (success, survival, failure, economic and financial indicators of performance, etc.). In a same technological application, it would be possible to implement the different aspects developed in the research: (i) to collect and process the necessary information for the estimations; (ii) training the specific neural network for the specific socio-economic situation to be improved; (iii) use of the forecasts to make the most appropriate recommendations to each individual; (iv) use the final information obtained to improve the estimates in subsequent counseling processes.

In short, we must be aware that we are heading to a time when human decisions can be based on the information that lies in extensive databases that cannot be accessed by the human brain (as in Stukal et al. 2019). The right use of artificial intelligence can allow us to optimize the chances of success in the implementation of solutions for the most significant economic and social problems of our days.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

References

Al-Jubari, I. 2019. College students' entrepreneurial intention: Testing an integrated model of SDT and TPB, *SAGE Open*, (92) https://doi.org/10.1177/2158244019853467

Álvarez, S. A.; Busenitz, L. W. 2001. The entrepreneurship of resource-based theory, *Journal of Management*, 27, 755-775.

Anzola, S. 1997. *De la idea a tu empresa. Una guía para emprendedores*, México, Ed. Limusa.

Aparanji, V. M.; Wali, U. V.; Aparna, R. 2018. Automated path search and optimization of robotic motion using hybrid ART-SOM neural networks. *In: Proceedings of International Conference on Recent Advancement on Computer and Communication*, Singapore, Springer, 415-423.

Azizi, M.; Mahmoudi, R. 2019. Learning outcomes of entrepreneurship education: Entrepreneurship education for knowing, doing, being, and living together, *Journal of Education for Business*, (943), 148-156. https://doi.org/10.1080/08832323.2018.1502139

Bárcena, A. 2020. *Coyuntura, escenarios y proyecciones hacia 2030 ante la presente crisis de Covid-19*. Santiago de Chile: CEPAL.

Baron, R. A. 2000. Psychological perspectives on entrepreneurship cognitive and social factors in entrepreneurs' success, *Current Directions in Psychological Science*, 9, 15-18.

Bruneel, J.; Spithoven, A.; Clarysse, B. 2017. Interorganizational trust and technology complexity: Evidence for new technology-based firms, *Journal of Small Business Management*, (55S1), 256-274.

Chaves Maza, M., Fedriani, E. M., & Ordaz Sanz, J. A. (2018). Factores relevantes para optimizar los servicios públicos de apoyo a los emprendedores y la tasa de supervivencia de las empresas. Innovar, 28(69), 9-24.

Covin, J. G.; Slevin, D. P. 1991. A conceptual model of entrepreneurship as firm behavior, *Entrepreneurship Theory and Practice*, (161), 7-25. Retrieved from: https://ssrn.com/abstract=1504448

Cuevas-Vargas, H.; Parga-Montoya, N.; Fernández-Escobedo, R. 2019. Effects of entrepreneurial orientation on business performance: The mediating role of customer satisfaction –A formative-reflective model analysis, *SAGE Open*, (92). https://doi.org/10.1177/2158244019859088

Curiel-Marín, E.; Passoni, L. I.; Olmedo-Moreno, E. M.; Fernández-Cano, A. 2018. Los mapas autoorganizados para la evaluación de la investigación de tesis doctorales: el caso de la didáctica de las Ciencias Sociales en España, *Relieve*, (241) https://doi.org/10.7203/relieve.24.1.12345

Dai, R., Hu, J., & Zhang, X. 2020. *The Impact of Coronavirus on China's SMEs: Findings from the Enterprise*.

DiGiacomo, A. 2020. La gobernabilidad en tiempos del COVID 19: una mirada desde Europa y Sudamérica. *Journal de Ciencias Sociales*. Douglas, T. J.; Judge, W. Q. 2001. Total quality management implementation and competitive advantage: the role of structural control and exploration, *Academy of Management Journal*, 44, 158-169.

Filella, J. 1997. *La personalidad empresarial, Iniciativa Emprendedora y Empresa Familiar*, 6, 13-19.

George, G.; Bock, A. J. 2011. The business model in practice and its implications for entrepreneurship research, *Entrepreneurship Theory and Practice*, (351), 83-111.

Global Entrepreneurship Research Association (GEM) 2020. Data base https://www.gemconsortium.org/data . London Business School,

Gibb, A. A. 1993. Key factors in the design of policy support for the small and medium enterprise (SME) development process: an overview, *Entrepreneurship & Regional Development*, 5, 1-24.

Moskvina, J. 2013. Social enterprises as a tool of social and economic policy, *Entrepreneurship and Sustainability Issues* 1(1):

45–54. http://dx.doi.org/10.9770/jesi.2013.1.1(5)

Hawkins, K. L.; Turla, P. A. 1987. *Compruebe sus dotes de emprendedor*, Madrid, Ediciones Deusto.

Ireland, R. D.; Covin, J. G.; Kuratko, D. F. 2009. Conceptualizing corporate entrepreneurship strategy, *Entrepreneurship Theory and Practice*, 33, 19-46. http://dx.doi.org/10.1111/j.1540-6520.2008.00279.x

Lamedica, R., Prudenzi, A., Sforna, M., Caciotta, M., & Cencellli, V. O. (1996). A neural network based technique for short-term forecasting of anomalous load periods. *IEEE Transactions on Power Systems*, 11(4), 1749-1756. https://doi.org/10.1109/59.544638

Larrea, I.; Ayerbe, M. 1996. *Jóvenes directivos y actitud empresaria*, Bilbao, Universidad de Deusto, Deustuko Unibertsitatea.

Mamun, A.; Che Nawi, N. B.; Mohiuddin, M.; Shamsudin, S. F. F. B.; Fazal, S. A. 2017. Entrepreneurial intention and startup preparation: A study among business students in Malaysia, *Journal of Education for Business*, (926), 296-314. https://doi.org/10.1080/08832323.2017.1365682

Mangiameli, P., Chen, S. K., & West, D. (1996). A comparison of SOM neural network and hierarchical clustering methods. European *Journal of Operational Research*, 93(2), 402-417. https://doi.org/10.1016/0377-2217(96)00038-0

Mitchelmore, S. and Rowley, J. (2010). Entrepreneurial competencies: a literature review and development agenda, *International Journal of Entrepreneurial Behaviour & Re-search*, 16, pp. 92-111.

Morris, M.; Schindehutte, M.; Allen, J. 2005. The entrepreneur's business model: toward a unified perspective, *Journal of Business Research*, (586), 726-735.

Peteraf, M. A. 1993. The cornerstones of competitive advantage: A resource-based view, *Strategic Management Journal*, 14, 179-191.
Rock, A. 1987. Strategy vs. tactics from a venture capitalist, *Harvard Business Review*, 65, 63-67.

Rothe, C.; Schunk, M.; Sothmann, P.; Bretzel, G.; Froeschl, G.; Wallrauch, C.; & Seilmaier, M. 2020. Transmission of 2019-nCoV infection from an asymptomatic contact in Germany. *New England Journal of Medicine*, (38210), 970-971.

Sandberg, W.; Robinson, R.; Pearce, J. 2001. Why small businesses need a strategic plan, *Business & Economic Review*, 48, 12-15.

Schnabl, P.A. 2010. The theory of the firm: microeconomics with endogenous entrepreneurs, firms, markets, and organizations. In: American Library Association Choice, http://dx.doi.org/10.1017/CBO9780511819902

Sörensson, A.; Bogren, M. 2019. Organizing an entrepreneurial learning programme: The role of people, process and place, *Industry and Higher Education*, doi: https://doi.org/10.1177/0950422219857598

Spulber, D. F. 2014. *The innovative entrepreneur*, Cambridge, Cambridge University Press.

Stewart Jr., W. H.; Roth, P. L. 2001. Risk propensity differences between entrepreneurs and managers: a meta-analytic review, *Journal of Applied Psychology*, 86, 145-153.

Stukal, D.; Sanovich, S.; Tucker, J. A.; Bonneau, R. 2019. For whom the bot tolls: A neural networks approach to measuring political orientation of twitter bots in Russia, *SAGE Open*, (92). https://doi.org/10.1177/2158244019827715

Timmons, J. A.; Spinelli, S. 1994. *New venture creation: Entrepreneurship for the 21st century*, Boston, Irwin.

Urban, U. 2018. The influence of the regulatory, normative and cognitive institutions on entrepreneurial orientation in South Africa, *The International Journal of Entrepreneurship and Innovation*, (203), 182-193. https://doi.org/10.1177/1465750318796721

Wiklund, J.; Shepherd, D. 2005. Entrepreneurial orientation and small business performance: A configurational approach, *Journal of Business Venturing*, 20, 71-91.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Acknowledgements

Manuel CHAVES-MAZA
ORCID ID: https://orcid.org/0000-0003-2420-8378

Eugenio M. FEDRIANI MARTEL
ORCID ID: https://orcid.org/0000-0002-1707-3308

IMPACT OF R&D EXPENDITURES ON THE COUNTRY'S INNOVATIVE POTENTIAL: A CASE STUDY

**Ardak Nurpeisova [1], Galiya Mauina [2], Shakizada Niyazbekova [3] , Ainur Jumagaliyeva [4],
Aigul Zholmukhanova [5], Yuliya Tyurina [6], Svetlana Murtuzalieva [7], Leila Maisigova [8]**

[1,2]*Financial Academy, 25 Esenberlin street, 010000, Nur–Sultan, Kazakhstan, S.Seifullin Kazakh Agro Technical University,
Zhenis 62, 010000, Nur-Sultan, Kazakhstan*
[3]*Moscow Witte University, 2nd Kozhukhovsky proezd 12 stroenie 1, 115432, Moscow, Russian Federation*
[4,5]*S.Seifullin Kazakh Agro Technical University, Zhenis 62, 010000, Nur-Sultan, Kazakhstan*
[6]*Financial University under the Government of the Russian Federation, 49, Leningradsky Prospekt, 125993, Moscow,
Russian Federation*
[7]*Peoples' Friendship University of Russia, 6 Mikluho-Maklaya str., 117198, Moscow, Russian Federation,*
[7] *Plekhanov Russian University of Economics,* Stremyanny lane 36, *Moscow, Russia*
[8]*Ingush State University, pr. Zyazikova, 7, 386001, Magas city, Russian Federation*

*E-mails: [1]nurpeisova.ardak81@gmail.com, [2]mauina_galiya@mail.ru, [3]shakizada.niyazbekova@gmail.com,
[4]ainyr_mir@mail.ru, [5]aigulzz@mail.ru, [6]u_turina@mail.ru,
[7]murtuzalieva@yandex.ru, [8]maisigova@yahoo.com*

Abstract. Kazakhstan has all the prerequisites for the formation of innovative potential. However, to ensure the innovative economic development of Kazakhstan, it is necessary to create favorable conditions that promote the commercialization of innovations. Otherwise, all expenditures that are currently primarily of a state nature will not have the required economic indicators. The modern theory of sustainable economic growth is based on the concept of innovation. That is why the main indicators of overall economic development depend on innovative development. The article studies the variability of a data group formed from indicators of innovative development of the economy of Kazakhstan, using one of the methods of reducing dimension as a correlation analysis. The data of 2000–2018 are analyzed, that is, for 19 years. Discusses the correlation analysis of indicators characterizing the amount of research and development costs and gross domestic product. The obtained correlation coefficients demonstrate a strong linear relationship between the selected indicators. The statistical analysis showed: patterns of change in the GDP of the economy internal R&D costs are almost identical, correlation-regression model of the impact of GDP on domestic R&D expenditures. That is, the number of innovatively active enterprises and internal R&D costs are interdependent variables with a close correlation. High correlation coefficients between the registration of patent applications and the grant of patents in Kazakhstan and the number of employees performing R&D. A strong but negative relationship between the number of organizations performing research and development and the rest, perhaps some organizations exist only nominally and their economic activity is minimal.

Keywords: impact; correlation; relationship; GDP dynamics; economic growth; innovation

1. Introduction

The study is devoted to the disclosure of the internal structure of the relationships in the data array used to assess the state of innovative development of the economy of Kazakhstan. Such work involves the statistical processing of raw data using multivariate statistical analysis methods. From a usual analysis of the dynamics of indicators, you can also get important information about the nature and patterns of data changes, but such a study, as a rule, does not provide a complete picture of the relationships.

One of the effective tools for statistical research in economics is correlation analysis, correlation analysis allows you to group the source data by the influence of external factors. That is, in essence, it is possible to create a statistical model of the problem in which the variability of all parameters is explained by the identified factors. The weight or significance of one or another factor can be estimated by the value of its share in the total variance of variables. And the close connection of each parameter of the problem with a specific factor is estimated by the correlation coefficient.

Research in the innovation sector of the economy, as a rule, comes down to an analysis of the dynamics of indicators using correlation and regression analyzes. From a usual analysis of the dynamics of indicators, you can also get important information about the nature and patterns of data changes, but such a study does not provide a complete picture of the relationships.

Of the methods of multivariate statistical analysis, the use of dimensionality reduction, as factor analysis is sometimes called, provides an opportunity to reveal the logical structure of a complex phenomenon. The main assumption of factor analysis is that phenomena in a certain field of research can be described by a relatively small number of factors. It is assumed that in the study area there is a pattern that combines the studied data into some groups.

Moreover, it is believed that each group of data has a certain factor. The term "factor" is used here in the sense of an objective reason, which unites heterogeneous data. That is, in essence, it is possible to create a statistical model of the problem in which the variability of all parameters is explained by the identified factors. The weight or significance of one or another factor can be estimated by the value of its share in the total variance of variables. And the close connection of each parameter of the problem with a specific factor is estimated by the correlation coefficient.

2. Literature review

Innovation is one of the most important components of the modern economy, a "stepping stone" to improving the quality of life and a sustainable, environmentally friendly future. Innovation is an important part of socio-economic life and human life in all its manifestations. Today, there are more than a hundred different definitions and interpretations of the term "innovation".

In recent decades, innovation has become one of the most intensively researched topics in economics and management. World practice shows that the development of innovations is not only the main tool to increase the competitiveness of a single enterprise, but also acts as a serious incentive for the economic development of the country as a whole.

Both the current state of innovative development of the economy of Kazakhstan and the history of its development are considered in detail in many analytical works (Satpayeva, 2017; Shevyakova, Munsh, Arystan, 2019; Petrenko, Vechkinzova, Antonov, 2019; Caurkubule, Kenzhin, Bekniyazova, Bayandina, Dyussembekova, 2020). An important result of studying the state of affairs is the conclusion that the country's innovative development, being an important sector of the economy, has not yet fully realized its potential capabilities.

The works of a number of scientists are devoted to the problems of innovative development of the economy, innovative activity of industrial enterprises and the introduction of innovations: (Cohen, 2010), (Baltgailis, 2019), (Chesbrough, Vanhaverbeke & West, 2006), (Cohen & Levinthal, 1989), (Damanpour & Aravind, 2012), (Denis, 2001), (Gogtay & Thatte, 2017), (Glen, 2015), (Hauke & Kossowski, 2011), (Murzabekova, 2010), (Niyazbekova, Grekov & Blokhina, 2016), (Nurzhanova, Niyazbekova, Nurpeisova, Imangozhina, Satenova, 2020), (Tereliansky, 2016), (Koroteev, Terelyanskii, Ivanyuk, 2016), (Satpayeva, 2017), (Tvaronavičienė & Razminienė 2017), (Schumpeter, 1934), (Schumpeter, 1942), (Semenyuk, Abdrashitova, Beloussova, Nechay, Listkov, Kurbatova, Niyazbekova, 2018), (Xiong, Jianmu, Wang, 2019). (Vigliarolo, 2020), (Weidlich, 2000), (Tvaronavičienė, & Ślusarczyk, 2019), (Witt & Zellner, 2009).

In the studies ofscientists, experts in economics and management, correlation analysis by the method of identifying the relationship, the mutual influence of various socio-economic processes.

In 1896, the correlation coefficient was first formulated and studied by Karl Pearson (Hauke & Kossovsky, 2011), with the concepts of correlation of Francis Galton: (Hauke & Kossovsky, 2011). Correlation analysis is used in the study of risks in the field of public and private investment management. The problems of the influence of financial markets on sustainable economic growth are investigated.

Correlation analysis is also used in the field of risk reduction associated with the management of production and company assets. Risks associated with solving organizational problems. Some scholars pay great attention to studying the correlation of the dynamics of the tourism industry and regional economic growth.

Correlation is designed to study the degree of relationship between two variables. The correlation coefficient is a measure to quantify the degree of relationship between variables. Essentially, the correlation coefficient r will be in the range from -1 to +1, i.e., $-1 \leq r \leq +1$ (Hauke & Kossovsky, 2011).

3. Methodology

An important component of the development of the country's economy is innovation, the level of development of which creates the basis for the sustainability of economics growth, contributes to the implementation of the strategic objectives of the territory. Innovative activity is an indicator of innovative activity. In accordance with the methodology of the Committee of Statistics of the National Economy of the Republic of Kazakhstan, innovation activity is determined by the ratio of the number of organization implementing technological, organizational, marketing innovations to the total number of organizations surveyed. Figure 1 illustrates the dynamics of innovation activity in the field of innovation in Kazakhstan for 2008-2018.
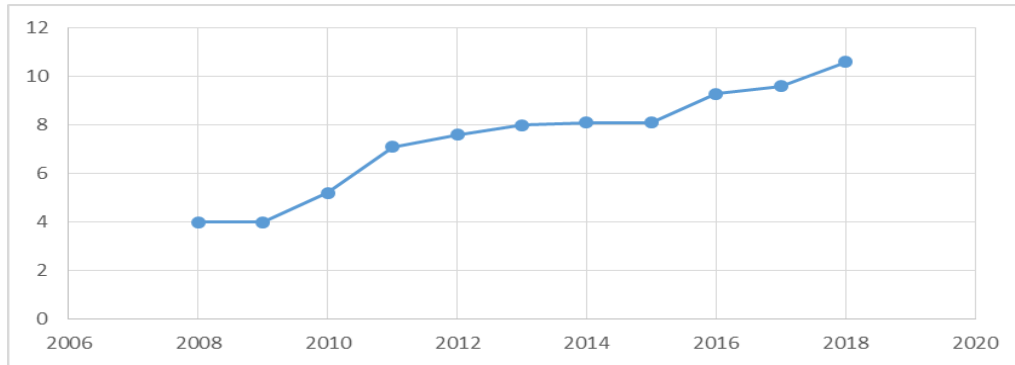
Figure 1. Level of activity in the field of innovation. Source: Committee on statistics, Ministry of national economy of the Republic of Kazakhstan

As the source of data used "Basic socio-economic indicators of the Republic of Kazakhstan for 1991-2019". The data of 2000-2018 are analyzed, that is, for 19 years. From the entire list of data on the innovative development of the country's economy, the analysis included the following indicators: a) GDP at current U.S. prices dollars, billions; b) domestics R&D costs in dollars (Table 1).

Table 1. Indicators that characterize R &D expenditures and GDP at current prices

Years	GDP at current prices U.S. dollars, Billions (y_i)	Internal R & D expenditures in millions of dollars (x_i)
2000	18,292	33,11616126
2001	22,153	48,75357776
2002	24,637	62,84512004
2003	30,834	77,84128894
2004	43,152	107,1728903
2005	57,125	162,0063215
2006	81,003	196,6841145
2007	104,85	218,9800082
2008	133,442	288,957606
2009	115,309	264,3301695
2010	148,047	227,1245334
2011	192,626	295,6731687
2012	207,999	350,2296962
2013	236,635	405,3947282
2014	221,416	364,5472527
2015	184,388	374,6102703
2016	137,289	195,8826471
2017	162,887	220,7826923
2018	172,941	220,8700306

Source: World Bank Open Data

We will find out whether there is a relationship between the indicators characterizing the costs of R&D and the indicators of GDP.

To do this, we construct a correlation analysis between two groups of indicators: a) GDP at current U.S. prices. dollars, Billions, b) internal R&D costs in dollars.
The correlation coefficient is estimated by the following formula:

$$r_{xy} = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2 \sum_{i=1}^{n}(y_i - \bar{y})^2}}$$

where, x_i — sample data on internal research and development costs in the Republic of Kazakhstan (in dollars); y_i — sample data on GDP at current prices (dollars); n — number of observations; $\bar{x}, \bar{y}$ — estimates of mathematical expectations.
Thus, the correlation coefficient for the quantities x_i, y_i is:

$$r_{xy} = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2 \sum_{i=1}^{n}(y_i - \bar{y})^2}} = 0.9380$$

Thus, the correlation value is 0.9380. This means that x_i, y_i there is a fairly close linear relationship between the variables, and on the basis of research it can be concluded that innovative development is highly dependent on the use and implementation of highly efficient technologies and the latest developments, as well as the development of science and technology.
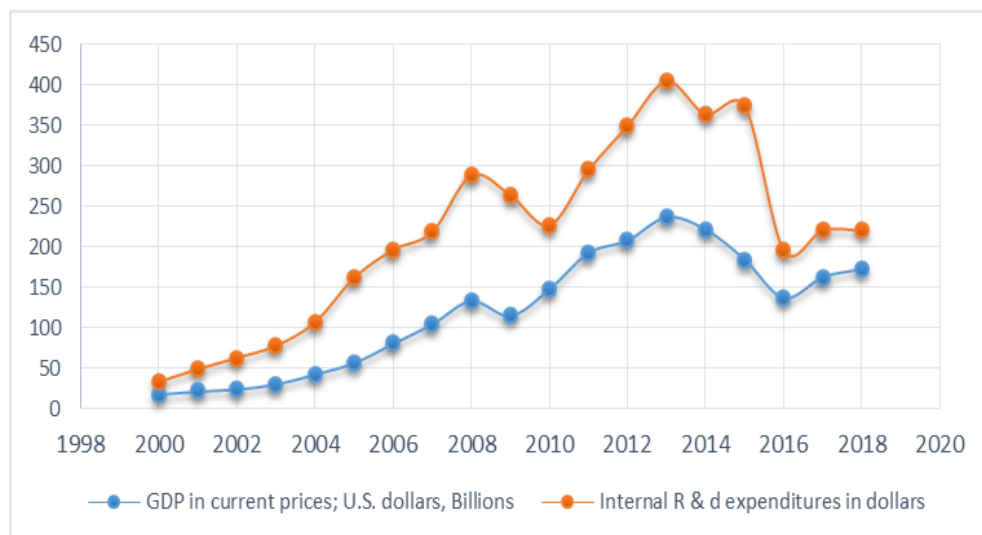
Figure 2. Indicators that characterize the introduction of innovations in the economy of the Republic of Kazakhstan.

Figure 2 shows graphs of changes in GDP at current prices, as well as domestic R&D costs (in dollars). From a visual inspection of the graphs it can be seen that the patterns of change in the GDP of the economy and the internal costs of R&D are almost identical.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
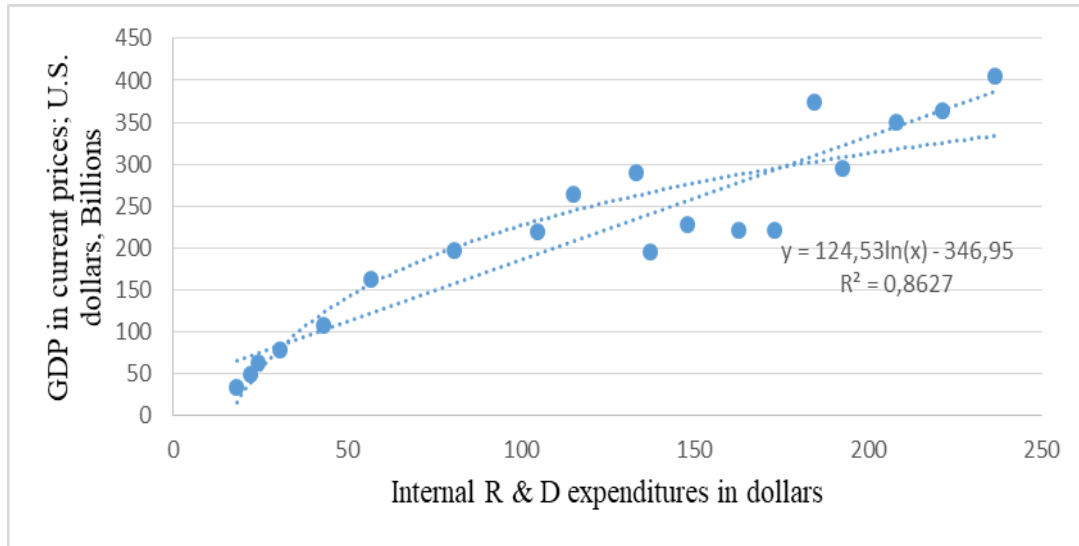
Figure 3. Correlation and regression model of the impact of GDP on domestic R & d expenditures.

The calculated correlation and regression model shows a strong positive effect of GDP on domestic R&D expenditures (Figure 3).

Figure 3 shows a comprehensive statistical method for spot forecasting a system of economic indicators. The main features of this method are:

1. The method allows in a complex to consider a variety of useful information about the forecasted system of economic indicators: trends in indicators over time, statistical patterns of relationships between indicators, balance ratios, etc.

2. When making predictive calculations of economic indicators using the integrated method, you can simultaneously use an arbitrary number of private statistical models for each forecast indicator. Between themselves, these models can differ in the number and composition of the independent factors of the economic process that enter into them, the structure of the relationship between the dependent and independent variables of the external and internal environment of the organization.

To identify the best trend equation of the analyzed time series, we determine the parameters of the following main types of trends: linear, parabolic, power-law, exponential, hyperbolic. The results of these calculations are shown below:

1. Linear finction
   $y=1.4705x+39.003$; $R^2 = 0.8799$
2. Logarithmic function
   $y=124.53\ ln(x)-346.95$; $R^2 = 0.8627$
3. Power function
   $y=4.1931x^{0.928}$; $R^2 = 0.9322$
4. Exponential function
   $y=60.287e^{0.009}$; $R^2 = 0.7975$

The calculated correlation and regression model show a strong positive effect of GDP on domestic R&D expenditures (Figure 3). The highest values of the exponent R^2 correspond to nonlinear functions, like the logarithmic function ($R^2 = 0.8627$) and the exponential function ($R^2 = 0.795$).

4. Application functionality

In this section, we consider the innovative activity of Kazakhstan enterprises in all types of innovations. The full use of innovations for national development is possible only if a targeted innovation policy is carried out at the state level. This task is especially relevant for Kazakhstan, which has significant innovative potential, which is clearly used insufficiently. Thus, the level of innovative activity of enterprises, despite the growth from 9.3 in 2016 to 9.6 in 2017 and in 2018, reached only 10.6. The number of enterprises with innovations decreased from 421 in 2008 to 384 in 2018.

The innovative activity of Kazakhstan enterprises in all types of innovations in 2018 was characterized as follows. Of the 30,501 respondents, only 3,230 were innovation-active, that is, the level of activity in the field of innovation was only 10.6%. The enterprises of the Republic of Kazakhstan by type of innovation are divided into the following:
- product innovations;
- process;
- marketing;
- organizational innovation.

In 2018, out of 3,230 innovation-active enterprises, 863 had product innovations, 1,530 had process innovations, 700 had marketing innovations, 1,082 had organizational innovations, and only 37 had all four types of innovations. The innovative activity of enterprises in product and process innovations does not have a pronounced upward trend. If in 2008 the level of activity of enterprises in this area was 4.0%, then in 2018 it increased to 10.6%.

Kazakhstani enterprises do not seek to research and development independently and are not inclined to invest in the creation of new products. One of the problems of innovative development in Kazakhstan is the incompleteness of scientific research, its separation from production, as the applied developments are not continued in the form of commercialization and implementation in production. In order to solve this problem, Kazakhstan has adopted a number of Programs, created Institutes, adopted Laws. An important role in this is given to the development of innovative entrepreneurship capable of quickly establishing high-tech products.

In the Republic of Kazakhstan, 384 organizations were engaged in research and development in 2018 (386 organizations in 2017).So in 2018, in terms of the number of innovatively active enterprises, the three leaders were: Almaty - 135 enterprises, Nur-Sultan - 60 enterprises, East Kazakhstan region - 35 enterprises.

At the same time, the smallest number of innovation-active ones according to the results of 2018 was demonstrated by Mangistau region - 6 enterprises, North Kazakhstan region –5 enterprises (Table 2).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Table 2. Number of organizations performing research and development in the regions of Kazakhstan

	2014	2015	2016	2017	2018
Republic of Kazakhstan	392	390	383	386	384
Akmola	11	11	9	11	11
Aktobe	14	14	14	16	16
Almaty	13	11	10	11	9
Atyrau	9	10	11	10	10
West Kazakhstan	9	7	8	8	10
Zhambyl	11	11	11	11	9
Karaganda	31	32	33	29	28
Kostanay	13	14	13	14	12
Kyzylorda	6	8	10	8	7
Mangystau	7	5	7	6	6
Pavlodar	11	9	10	11	14
North Kazakhstan	3	4	5	5	5
Turkestan	5	4	5	6	6
East Kazakhstan	30	30	35	34	35
Nur-Sultan	59	53	55	62	60
Almaty	148	152	133	131	135
Shymkent	12	15	14	13	11

Source: Ministry of National Economy of the RK, committee of statistics, information for 2019

The highest level of innovative activity of enterprises was observed in the East Kazakhstan region - 15.5%, which is almost 1.5 times higher than the republican indicator. Next come the cities of Nur-Sultan and the cities of Karaganda, the cities of Kyzylorda - 14.7%, 14.7 and 12.2%, respectively. The lowest indicators of innovative activity of enterprises in the Mangistau region are 4.0% (Figure 4).

Analysis of statistical data on the innovative development of the regions of Kazakhstan allows us to distinguish three groups of regions of the Republic of Kazakhstan by the level of innovative activity:
- with a low level: Mangistau, Turkestan, West Kazakhstan;
- with an average level: Kostanay, Kyzylorda, North Kazakhstan, etc.;
- with a high level: East Kazakhstan region, the city of Nur-Sultan and Karaganda region.

The Republic of Kazakhstan is characterized by significant differences in the level of innovative potential of the regions, while the innovative capabilities of most areas can be rated as average.

In the modern world, transport services provide an increase in the efficiency of social production, the normal functioning of the economy. The issue of introducing innovations in the transport sector of Kazakhstan is of great relevance, since it is here that conditions are created for the rational distribution of production forces across the country, taking into account the most appropriate approach to production consumption areas and sources of raw

materials for enterprises of various sectors of the economy, which allows such industries as agriculture to develop, trade and the rest.
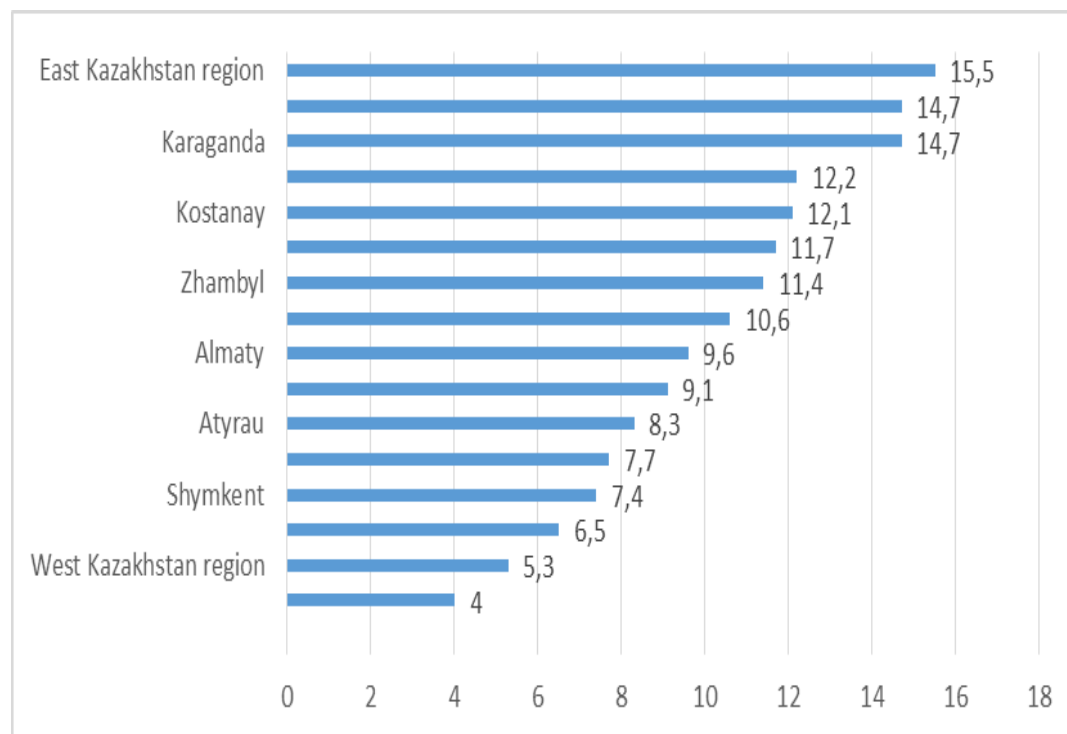
Figure 4. The level of innovation activity of enterprises for all types of innovations in 2018.

The expenditures of Kazakhstan for research and development (R&D) averaged 0, 1% of GDP, while on the recommendation of UNESCO, developing countries need to bring R&D expenditures to 1% of GDP. Currently, the share of scientific research in the EU countries is on average 1.8 percent of European GDP, it is planned to bring this indicator to 4 percent.

This indicator is in Finland - 3.49%, Korea - 3.64%, USA - 2.6%, China - 1.44% of the country's gross domestic product, and on average in the countries of the Organization for Economic Cooperation and Development - 2, 24%.

In comparison with the data for Kazakhstan, this suggests that financial support for research and development remains a weak link in Kazakhstan's innovation policy. For comparison, it should be noted that in developed countries, the expenditures of the business sector significantly exceed government spending on R&D, since fundamental research is traditionally carried out in the public sector, and the business sector is engaged in applied research.

Table 3. Introduction of innovations in the economy of the Republic of Kazakhstan

Main indicators	2010	2011	2012	2013	2014	2015	2016	2017	2018
Domestic expenditures on research and development, million tenge	33466,8	43351,6	51253,1	61672,7	66347,6	69302,9	66600,1	68884,2	72224,5
GDP as a percentage	0,15	0,15	0,16	0,17	0,17	0,17	0,14	0,13	0,12
The number of organizations in which R & D units	424	412	345	341	392	390	383	386	384
Number of employees performing R & D, people	17021	18003	20404	23712	25793	24735	22985	22081	22378
Among them are specialists-researchers	10870	11488	13494	17195	18930	18454	17421	17205	17454
Doctor of science	1341	1246	1065	1688	2006	1821	1828	1818	1740
Doctor of philosophy PhD	59	95	131	218	330	431	456	589	856
Research and development	103571	121395	148530	153567	171626	184940	208752	228385	240717

Source: Ministry of National Economy of the RK, committee of statistics, information for 2019

A quantitative approach to assessing innovative potential involves the analysis of a system of statistical indicators that reflect the dynamics of the development of the scientific and innovative sphere. In the Republic of Kazakhstan in recent years, the costs of research and development have steadily increased in comparable prices. Figure 5 presents the dynamics of the main indicators of the state and development of science in Kazakhstan for 2010-2018.
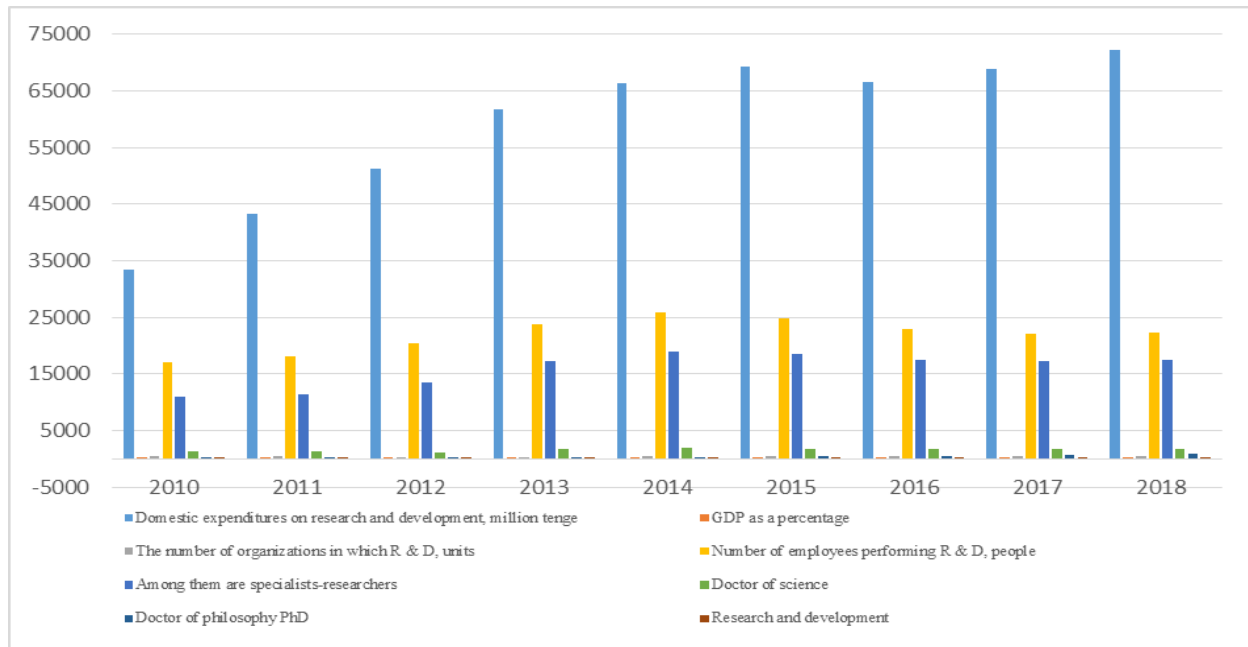
Figure 5. Main indicators of science development in Kazakhstan for 2010-2018

Let us consider the dependencies of the key factors of the innovative development of the Kazakhstan economy, including:

- number of employees performing R&D, by ownership of organizations, thousand people;
- number of innovatively active enterprises, units;
- domestic R&D costs, mln tenge;
- domestic R&D costs from the public sector, mln tenge;
- share of innovative products (goods, services) to GDP;
- costs of technological innovation of enterprises by ownership, mln tenge;
- registration of trademarks and service marks;
- number of organizations performing research and development, units;
- research and development.

Of interest is the value of the pair correlation coefficient between v2 and v3: 0.96. That is, the number of innovatively active enterprises and internal R&D costs are interdependent variables with a close correlation. Finding a correlation between the costs of technological innovation and the share of innovative products in GDP showed that the relationship is positive, but not strong: 0.41.

The high correlation coefficients between the registration of patent applications and the grant of patents in Kazakhstan and the number of employees performing R&D, internal R&D expenditures, and the share of innovative products in GDP ($r = 0.95$, $r = 0.78$, $r = 0.81$) indicates the fact that the country has a favorable economic situation and an increase in the intensity of state regulation leads to an increase in scientific activity.

Let us analyze the above data on the introduction of innovations in the economy. The calculation results are shown in Table 4, which presents a matrix of correlation coefficients.

In order to analyze the interconnections between the GDP indicators, table 4 shows the paired correlation coefficients.

Table 4. Correlation matrix of indicators that characterize the introduction of innovations in the economy of the Republic of Kazakhstan

Variables		v 1	v 2	v 3	v 4	v 5	v 6	v 7	v 8	v 9
Number of employees who performed R & D, by form of ownership of organizations, thousand people.	v 1	1,00	0,80	0,91	0,81	0,73	0,62	0,95	-0,87	0,76
Number of innovative-active enterprises, units	v 2		1,00	0,96	0,84	0,72	0,87	0,87	-0,60	0,98
Domestic expenditures on research and development, million tenge	v 3			1,00	0,90	0,77	0,78	0,94	-0,75	0,94
Internal R & D expenditures from the public sector, million tenge	v 4				1,00	0,70	0,65	0,78	-0,78	0,83
Share of innovative products (goods, services) to GDP	v 5					1,00	0,41	0,81	-0,75	0,75
Expenditures on technological innovations of enterprises by ownership forms, million tenge	v 6						1,00	0,70	-0,45	0,85
Registration of trademarks and service marks and granting of patents	v 7							1,00	-0,81	0,86
Number of organizations that performed research and development, units	v 8								1,00	-0,59
Research and development	v 9									1,00

A strong but negative relationship between the number of organizations performing research and development and the rest (r = -0.87, r = -0.75, r = -0.81, r = -0.78), perhaps some organizations exist only nominally and their economic activity is minimal.

As is known, the pair correlation coefficient shows the degree of tightness of the relationship between only two variables under the indirect influence of other variables. That is, correlation analysis does not provide a complete picture of the relationships between variables.

The state as a whole supports the implementation of scientific developments of innovative implementations. This is confirmed by an increase in the real value of domestic research costs from the state budget. Despite the increase in state budget revenues, the number of organizations performing research and development is declining.

Conclusions

The analysis included: the number of employees performing R&D, by ownership of organizations; number of innovatively active enterprises; internal R&D costs; domestic R&D costs from the public sector; share of innovative products (goods, services) to GDP; costs of technological innovation of enterprises by ownership;

registration of trademarks and service marks; number of organizations performing research and development; number of scientific developments.

Thus, the statistical analysis showed:
- correlation analysis between two groups of indicators: a) GDP at current U.S. prices. dollars, Billions, b) internal R&D costs in dollars. The analysis showed that the patterns of change in the GDP of the economy in the period 2000-2018. domestic R&D costs are almost identical (0.7393);
- correlation-regression model of the impact of GDP on domestic R&D expenditures; the calculated correlation-regression model shows a strong positive effect of GDP on domestic expenditures on R&D;
- correlation matrix of indicators characterizing the introduction of innovations in the economy of the Republic of Kazakhstan. The analysis showed that between the pair correlation coefficients v2 and v3 is 0.96. That is, the number of innovatively active enterprises and internal R&D costs are interdependent variables with a close correlation;
- also in the study of indicators characterizing the introduction of innovations in the economy of the Republic of Kazakhstan, the relationship between the costs of technological innovation and the share of innovative products to GDP showed that the relationship is positive, but not strong: 0.41;
- high correlation coefficients between registration of patent applications and the grant of patents in Kazakhstan and the number of employees performing R&D in the period 2000-2018. domestic expenditures on R&D, the share of innovative products in GDP ($r = 0.95$, $r = 0.78$, $r = 0.81$);
- a strong but negative relationship between the number of organizations that performed research and development and the rest ($r = -0.87$, $r = -0.75$, $r = -0.81$, $r = -0.78$), perhaps some organizations exist only nominally and their economic activity is minimal.

Thus, based on the analysis, it is possible to formulate an innovation policy is an important, but not the only tool for managing GDP growth, which proves the research conducted in this article. Many studies of the impact of innovation on GDP dynamics show that the level of interconnection between innovation and the economic development of different countries varies.

The results of the study show that the country has a positive relationship between GDP growth and R&D expenditures. Analyzing the relationship between GDP growth dynamics and innovation variables in Kazakhstan, in most cases, one can observe a rather weak association of innovations and economic development. Certain measures were proposed that should be taken by the Kazakh authorities to stimulate innovation and economic growth. Based on the experience of technologically developed countries, the Kazakh government offers promising innovative policy measures to stimulate economic growth. It is important to ensure the proper level of growth in costs for technological innovations in order to enhance autonomy in Kazakhstan.

References

Baltgailis, J. 2019. The issues of increasing the effectiveness of teaching comparative economics. Insights into Regional Development, 1(3), 190-199. https://doi.org/10.9770/ird.2019.1.3(1)

Caurkubule, Zh. L., Kenzhin, Zh. B. Bekniyazova, D.S., Bayandina, G.D., Dyussembekova, G. S. 2020. Assessment of competitiveness of regions of the Republic of Kazakhstan. Insights into Regional Development, 2(1), 469-479. http://doi.org/10.9770/IRD.2020.2.1(6)

Chesbrough, H. W., Vanhaverbeke, W., & West, J. (Eds.). (2006). Open Innovation. Researching a New Paradigm. Oxford: Oxford University Press.

Cohen, W. M. (2010). Fifty years of empirical Studies of innovative activity and performance. In B. W. Hall & N. Rosenberg (Eds.), Handbook of the economics of innovation (pp. 129–213). Amsterdam: Elsevier.

Cohen, W. M., & Levinthal, D. A. (1989). Innovation and learning: the two faces of R&D. Econ J, 99, 569–596.

Damanpour, F., & Aravind, D. (2012). Managerial innovation: conceptions, processes, and antecedents. Management and Organization Review, 8, 423–454.

Denis, J. D. (2001), The origins of correlation and regression: Francis Galton or Auguste Bravais and the error theorists? History and Philosophy of Psychology Bulletin, 13, pp. 36-44.

Glen, S. (2015), Multicollinearity: Definition, Causes, Examples, https://www.statisticshowto.datasciencecentral.com/multicollinearity/

Gogtay, N. J. and Thatte, U. M. (2017), Principles of correlation Analysis, Journal of The Association of Physicians of India, 65 (March), pp. 78-81.

Hauke, J., Kossowski, T. (2011), Comparison of values of Pearson's and Spearman's correlation coefficients on the same sets of data, Questiones Geographicae, 30(2), pp. 87-93 http://dx.doi.org/10.2478/v10117-011-0021-1

Koroteev, M., Terelyanskii, P.V., Ivanyuk, V.A. (2016). Arithmetic of Fuzzy Numbers in Generalized Trapezoidal Form. Journal of Mathematical Sciences. Journal of Mathematical Sciences, 216(5) http://dx.doi.org/10.1007/s10958-016-2931-x

Murzabekova, G. Y. (2010). Exhausters and implicit functions in nonsmooth systems, optimization. A Journal of Mathematical Programming and Operations Research, 59(1), 105-113

Niyazbekova, Sh. U., Grekov, I.E., Blokhina, T.K. (2016), The influence of macroeconomic factors to the dynamics of stock exchange in the Republic of Kazakhstan. Economy of region, 12(4), 1263-1273. http://dx.doi.org/10.17059/2016-4-26

Nurzhanova, G. I., Niyazbekova Sh. U., Nurpeisova, A. A, Imangozhina, Z A., Satenova. D. E. (2020), Youth labor Market Analysis and Assessment of the Republic of Kazakhstan. International Scientific Conference "Far East Con" (ISCFEC 2020)
, 17 March, 360-366, https://doi.org/10.2991/aebmr.k.200312.053

OECD/Eurostat (2005) Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, 3rd Edition, The Measurement of Scientific and Technological Activities, OECD Publishing, Paris, https://doi.org/10.1787/9789264013100-en

Petrenko, Y., Vechkinzova, E., Antonov, V. 2019. Transition from the industrial clusters to the smart specialization of the regions in Kazakhstan. Insights into Regional Development, 1(2), 118-128. https://doi.org/10.9770/ird.2019.1.2(3)

Satpayeva, Z. T. (2017), State and Prospects of Development of Kazakhstan Innovative Infrastructure. European Research Studies Journal XX(2B), 123-148.

Schumpeter, J. A. (1934). Theory of economic development. Cambridge: Harvard University Press.

Schumpeter, J. A. (1942). Capitalism, socialism and democracy. New York: Harper.

Semenyuk, O., Abdrashitova, T., Beloussova, E., Nechay, N., Listkov, V., Kurbatova, V., Niyazbekova, S. (2018), The influence of ecology and economic factors on eco-architecture and the design of energy efficient buildings. World Transactions on Engineering and Technology Education, 16(2), 186-192. EID: 2-s2.0-85047534215

Shevyakova, A., Munsh, E., Arystan, M. 2019. Information support for the development of tourism for the diversification of the economy of Kazakhstan, Insights into Regional Development, 1(2), 138-154. https://doi.org/10.9770/ird.2019.1.2(5)

Tereliansky, P. (2016), The variability of fuzzy aggregation methods for partial indicators of quality and the optimal method choiceARPN Journal of Engineering and Applied Sciences. http://www.arpnjournals.org/jeas/research_papers/rp_2016/jeas_0816_4734.pdf

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Tvaronavičienė, M., & Ślusarczyk, B. (2019). Energy transformation towards sustainability. Energy Transformation Towards Sustainability (pp. 1-333) https://doi.org/10.1016/C2018-0-02510-4   Retrieved from www.scopus.com

Tvaronavičienė, M., Razminienė K. (2017). Towards competitive regional development through clusters: approaches to their performance evaluation. Journal of Competitiveness, 9(4), 133-147. https://doi.org/10.7441/joc.2017.04.09

Vigliarolo, F. (2020). Economic phenomenology: fundamentals, principles and definition. Insights into Regional Development, 2(1), 418-429. http://doi.org/10.9770/IRD.2020.2.1(2)

Weidlich, W. (2000). Sociodynamics - a systematic approach to mathematical modeling in the social sciences. Amsterdam: Harwood.
Witt, U., & Zellner, C. (2009). How firm organizations adapt to secure a sustained knowledge transfer. Econ Innov New Technol, 18(7), 647–661.

Xiong, X., Jianmu, Ye, J., Wang, P. 2019. Does the Institutional Environment Affect the Failed Technological Innovation in Firms? Evidence from Listed Companies in China's Pharmaceutical Manufacturing Industry, Transformations In Business & Economics, 18(1(46)), 60-80.

Ardak NURPEISOVA, PhD student of Financial Academy, Nur–Sultan, Kazakhstan, S.Seifullin Kazakh Agro Technical University, Nur-Sultan, Kazakhstan. Research interests: economics, national economy, innovation.
ORCID ID: https://orcid.org/0000-0002-1245-8313.

Galiya MAUINA, Candidate of Economic Sciences, Associate Professor, Department of economics, Financial Academy, Nur-Sultan, Kazakhstan, S.Seifullin Kazakh Agro Technical University, Zhenis 62, 010000, Nur-Sultan, Kazakhstan. Research interests: economics, national economy, innovation.
ORCID ID: https://orcid.org/0000-0003-3935-6533

Shakizada NIYAZBEKOVA, Doctor of Philosophy PhD, Assistant Professor, Department of Finance and Credit, Moscow Witte University, Moscow, Russia. Research interests: economics, finance, innovation.
ORCID ID: https://orcid.org/0000-0002-3433-9841

Ainur JUMAGALIEVA, Senior Lecturer, S.Seifullin Kazakh Agro Technical University, Nur-Sultan, Kazakhstan. Research interests: information and communication technologies, economics, innovation.
ORCID ID: https://orcid.org/0000-0001-8632-5209.

Aigul ZHOLMUKHANOVA, Candidate of Economic Sciences, Associate Professor, Department of marketing and service, S.Seifullin Kazakh Agro Technical University, Nur-Sultan, Kazakhstan. Research interests: economics, national economy, innovation.
ORCID ID: https://orcid.org/0000-0003-4419-5439

Yuliya TYURINA Doctor of economic sciences, associate professor, Professor of the Financial University under the Government of the Russian Federation, Moscow, Russian Federation
Research interests: economic, finance, management, innovation
ORCID ID: https://orcid.org/0000-0002-5279-4901

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

**Svetlana MURTUZALIEVA**, Docent, Applied Economics. People's Friendship University of Russia (RUDN) of the Russian Federation, Moscow, Miklukho-Maklaya str.6, Plekhanov Russian University of Economics, Moscow, Russia. Research interests: management, economics, finance, innovation
ORCID ID: http://orcid.org/0000-0002-3099-120X

Leila MAISIGOVA, candidate of Economic Sciences, Ingush State University, Magas, Russian Federation. Research interests: economic, finance, management, innovation
ORCID ID: https://orcid.org/0000-0003-2148-4924

SUSTAINABLE DEVELOPMENT OF SMART CITIES IN THE CONTEXT OF THE IMPLEMENTATION OF THE TIRE RECYCLING PROGRAM[*]

Tatyana Khudyakova [1], Andrey Shmidt [2], Svetlana Shmidt [3]

[1,2] South Ural State University, Department of Applied Economics, 76, Lenin av., Chelyabinsk, Russia
[3] Saint-Petersburg State University, Department of Mathematics and Computer Science, Saint-Petersburg, Russia

E-mails: [1] khudiakovata@susu.ru; [2] shmidtav@susu.ru; [3] lana0771711@gmail.com

Abstract. At the present moment of society's development, the concept of Smart City development is attracting more and more attention. According to this approach, urban space should be implemented from the position of improving the quality of life of citizens. As part of the development of a smart city, rational and economical use of resources is assumed. This attitude to resources allows not only to save resources but also to improve the quality of life of the population, particularly by improving the environmental situation in the regions. In the world practice of developing cities, the recycling processes are becoming more and more relevant. On the one hand, this saves material and energy resources. On the other hand, these measures help to improve the quality of the environment in the regions. Recently, two concepts have become a trend in the development of urban economy in world practice. One of them is the concept of a smart city, the other is the concept of sustainable urban development. Despite a number of differences, both approaches to city management imply a focus on environmental friendliness. Implementing strategies of development of Russian cities in the framework of the concept of sustainable development and within the concept of smart cities aims to improve the environmental situation in the country. Therefore, the aim of the research was to improve the environmental potential of Russian regions through the use of modern Russian and foreign research, in particular through the tire recycling program. For Russia, one of the key environmental problems is the problem of recycling car tires. Despite the emergence of new eco-friendly ways of recycling tire waste, it is becoming more acute every year. This is understandable, because the number of cars increases every year. Currently, decommissioned tires are a source of environmental pollution in most of the Russian regions. However, this source of pollution is a long-term source. This is due to the fact that worn tires are practically not susceptible to natural decomposition, and, as a result, require increasing space for their storage and disposal. The article provides an analysis of the dynamics and prospects of car tire recycling in the framework of the concept of sustainable development of smart cities. A comparative analysis of the state of this issue in Russian and foreign practice is presented. In addition, according to statistic analysis, the article provides a forecast analysis of the increase in waste in the form of tires and an analysis of the regulatory framework governing the recycling process.

Keywords: smart city; sustainable city; circular economy; waste management; economic effect; resource-saving technologies; tire recycling

---

JEL Classifications: G32, M40, Q01, O10, O21

1. Introduction

According to the McKinsey Agency, there are about 200 smart cities in the world today. The most developed in this area include London, Singapore, Seoul, New York, Helsinki, Montreal, Boston, Melbourne, Barcelona, and Shanghai. At the same time, there are practically no Russian regions in the international smart city rankings, with the exception of Moscow, St. Petersburg, and Novosibirsk, which are also far from leading positions. At the same time, by the end of 2025, it is planned that there will be about 600 smart cities in the world (Urban world: Mapping the economic power of cities, 2011). This means that the number of smart cities in the world should increase by 3 times. This makes it necessary to develop approaches to creating and managing Smart City development as soon as possible (Machado, 2017).

The Ministry of construction of the Russian Federation has adopted a pilot project to create a Smart City on the basis of Russian cities. In addition, 8 Russian cities such as Krasnodar, Innopolis, Tolyatti, Novorossiysk, Sarov, Sochi, Voronezh and Magas are part of the International Smart Sustainable City Club (ISSCC).

However, today there is no clear approach to the concept of "Smart City". But having studied the world's leading practices, we agree that a smart city is a new approach to the implementation of urban space based on the use of digital technologies, based on the principles of:
- ✓ the open space;
- ✓ management transparency;
- ✓ involvement of citizens in the management process;
- ✓ improving the quality of life (Saptadi *et al.*, 2019).

Smart city combines several elements such as:
- ✓ smart environment (renewable energy, resource saving, etc);
- ✓ smart mobility (transport networks, smart parking, wifi coverage, etc.);
- ✓ smart lifestyle (comfortable structure of the city, health saving technologies, etc.);
- ✓ smart people (educated, able to participate in urban processes using ICT).
- ✓ smart economy (Saptadi *et al.*, 2019).

Thus, a "smart city" is a city that strives to ensure sustainable development in all plans (economic, social, political), as well as a high quality and standard of living with reasonable management of natural resources and the environment, while using digital and information technologies, data collection, processing and analysis technologies, as well as technical solutions and appropriate infrastructure (Novikov *et al.*, 2019; Rostova *et al.,* 2019).

Thus, one of the important elements of forming a smart city system is the rational use of resources, which allows to save resources, as well as improve the quality of life, including by improving the environmental situation in the regions (Sienkiewicz *et al.*, 2017).

In the world practice of developing smart cities, recycling processes are becoming more and more popular. On the one hand, this saves material and energy resources. On the other hand, this makes it possible to improve the quality of the environment in the regions (Ahvenniemi *et al.,* 2017).

One of the key environmental problems in Russia is the problem of recycling car tires. It is becoming more acute despite the emergence of new eco-friendly ways to dispose of them. This is due to an increase in the number of cars.

However, similar problems are not unique to Russian cities. In this regard, it becomes very relevant to analyze the current state, as well as to identify the prospects for the development of municipalities from the perspective of sustainable development of smart cities.

Thus, the goal of the research is to increase the environmental potential of Russian cities within the framework of the implementation of the concept of sustainable development and the concept of smart cities, in particular through adequate utilization of tire waste.

The following problems should be resolved to achieve the goal:
1. Analysis of international urban development practices in accordance with the concept of sustainable development and the concept of a smart city from the point of improving the environmental component, in particular through adequate utilization of tire waste.
2. Identification of trends in tire waste disposal in international and Russian practice with a focus on sustainable development of territories.
3. Detection of the potential for the development of Russian cities in the framework of the concept of sustainable development and the concept of smart cities based on the analysis

2. Theoretical Framework and Literature Review

Countries are increasingly faced with the need to improve the efficiency and competitiveness of their economies. This is due to hyper-competition in the global market. However, for further development of production, it is necessary to increase the consumption of resources. This causes a huge increase in production waste. This becomes critical for the future existence of the society.

A similar problem was raised by Ahvenniemi et al. (2017). They note that, as expected, modern cities place much more emphasis on modern technology and "smartness" compared to urban sustainability concepts. At the same time, they emphasize that the environmental component is also important in the development of the smart city concept. In addition, they note that it is extremely important that when assessing the effectiveness of a smart city, not only indicators of the effectiveness of smart solutions are used, but also impact indicators that measure the contribution to the achievement of final goals, such as environmental, economic or social sustainability.

The need for a symbiosis of the concepts of "smart" and "sustainable" urban development is considered by Nižetić *et al.* (2019). In their opinion, it is intellectual technologies that will allow society to have a sustainable future. The main goal of modern society is sustainability and reasonable use of limited and valuable resources. However, as the authors note, there are completely different approaches and standards to sustainable development in society, which depend on geographical, temporal and cultural aspects.

Analysis of the current state of cities in the framework of two concepts "smart city" and "sustainable city" is considered in the study of Shmelev and Shmeleva (2018). This research analyzes more than 90 cities around the world. The results of the study showed that San Francisco leads in economic and environmental priorities, while Stockholm leads in social and smart urban priorities. Seoul is performing well across the entire spectrum of indicators.

Zhang et al. (2019), looking at the example of the Chinese economy, note that, of course, it is necessary to create a new type of management thinking aimed at the transition to a "circular economy with zero waste" (Zhang *et al.*, 2019). They note that this is particularly relevant for China. At the same time, the study says that this problem is extremely complex, because it involves many stakeholders. The research highlights twelve important barriers to intelligent waste management in China. Among the strongest barriers, the authors highlight "the lack of regulatory pressure, the lack of environmental education and culture of environmental protection, as well as the lack of market pressure and requirements." Also, among the problems mentioned are smart waste management, the lack of a legal framework for mandatory waste disposal, and economic and financial problems related to the lack of funding.

Similar barriers to spreading the concepts of a "smart" and simultaneously "sustainable" city are noted in the work of Zhang et al. (Zhang *et al.*, 2018).

Thus, it is clear that the creation of smart solutions for the organization of urban economy does not always provide for the environmental sustainability of these solutions.

For example, increasing transport accessibility as part of the development of the smart city concept, and the influx of people to these cities lead to an increase in the number of cars. This creates a problem associated with the disposal of failed cars and their parts.

The problem of increasing waste in the form of automobile tires has affected all developed countries. At present, this problem is receiving a lot of attention, both from the scientific community and from Governments.

At the same time, tire waste can be a good source of raw materials (Fagundes, 2017). This will not only solve environmental problems but also save financial resources.

So in their research Sienkiewicz et al. (2017) came to a number of conclusions based on a comprehensive review of changes in policies and approaches to tire recycling. First, the recycling and restoration of tires is a serious environmental problem due to their very complex structure and composition. Secondly, the governments of many countries are interested in developing new technologies for environmentally friendly recycling of tires. They note that there has been significant progress in sustainable waste management recently. This new approach is already being applied in the US, China, Japan and the EU. Also, the authors' note that used tires should not be considered as a pollutant, but as a source of materials.

Sienkiewicz et al. (2017) remark that already known technologies can be used for recycling tire waste. Thus, these measures do not require significant investment. But at the same time, they allow for "sustainable and clean recycling". It's good for both concepts - "smart city" and "sustainable urban development".

Gupta et al. also focused on waste recycling from the perspective of economic development (Gupta et al., 2019).

In their research Pereira et al. (Pereira *et al.*, 2018), based on data from Brazil, tried to deduce the correlation between the number of tires coming for recycling and external factors. This research assumes forecasting the percentage of utilization under different conditions.

A large group of scientific papers is devoted to the re-use of waste. In particular, considering tire waste as raw materials. The work notes that on the one hand, proper recycling of tire waste will reduce the level of environmental pollution, and on the other hand, will allow you to get an additional economic effect.

Thus, in their article, Arulrajaha et al. (2019) note that used tires are indeed a big problem for sustainable urban development. At the same time, they suggest using this raw material as the basis for road pavement (sidewalks). They say that the increased strength of this type of coating. This approach also fits well into both the concepts of "smart city" and "sustainable urban development".

Similar conclusions were reached by Wang et al. (2019). The rapid growth in the number of cars in China has generated an increase in tire waste. At the same time, it is noted that currently 62.8% of tire waste is not processed in China. As a solution to the problem with recycling, the authors proposed adding rubber crumbs to the asphalt concrete pavement. They note that this will "contribute to the sustainable management of worn tires." And the use of crumb for asphalt production will be on the one hand "an effective method of balancing the contradictions between the supply and demand of rubber crumb", and on the other hand will significantly reduce carbon emissions into the atmosphere. In addition, the authors note that this data will reduce the dependence on non-renewable resources in the production of asphalt.

Thus, urban management in the context of the implementation of two concepts at once: the concept of "Smart city" and the concept of "Sustainable urban development", of course, should become a driver of development.

However, there are factors that negatively affect the implementation of these concepts.

Ghosh et al. (2019) note that there are already many promising technologies for processing various types of waste. These technologies fully correspond to the concept of smart cities development. However, these methods are either not used at all, or are not fully used. This is particularly true in developing countries.

The same opinion is present in the work of M. Maryono and I. Hasmantika (2019). They believe that a number of technologies developed in advanced countries still cannot be applied in "cities of developing countries" because of their complexity. In addition, the authors note that the lack of environmental education of the population, as well as the lack of regulatory documents on waste disposal and recycling, greatly affects the development of cities within the framework of the concept of a smart and sustainable city.

Dong and Fujita (2015) note that it is difficult for society to balance economic growth with a low level of environmental pollution, in particular waste from burning tires. They note that in the framework of the development of society it is necessary to rely on the practice of Japanese cities with low carbon emissions. It focuses on two national initiatives: the eco-city project and the smart city project. The authors believe that applying this practice to Chinese cities will dramatically reduce carbon emissions into the atmosphere.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

3. Materials and Methods

3.1. The importance of tire recycling in the in the Russian Federation

Currently, decommissioned tires are a source of environmental pollution in most of the Russian regions. However, this source of pollution is a long-term source. This is due to the fact that worn tires are almost not susceptible to natural decomposition. As a result, they require more and more space for their storage and disposal.

Today, there are certain strategies for dealing with worn tires. The most common ones are:
- reuse;
- export;
- recovery;
- mechanical processing;
- thermal processing;
- burial.

However, the latter two approaches are not acceptable within the framework of the concept of sustainable regional development, as well as the concept of Smart City, which implies significant attention to environmental issues.

According to statistics, only about 20% of used tires are recycled in Russian regions (Rostova *et al.*, 2019).

At the same time, worn tires are an excellent source of recyclable materials. They contain rubber, carbon black (almost pure carbon), metal and synthetic cord. In this case, the rubber is 70% of the weight of the worn tire. (Wang *et al.,* 2020).

If incineration is used as a measure to dispose of tires, a large amount of toxic waste is released into the atmosphere. These emissions are several times higher than when burning coal (table 1), which also completely contradicts the concept of "smart cities" development:

Table 1. Emissions of pollutants into the atmosphere

Pollutant	Coal combustion	Burning of worn tires
Sulfur, %	2.00	1.3–2.2
Ash, %	11.30	12.5–18.6
Chlorine, %	0.14	0.20
Zinc, particles per million air particles	27.20	9300–20500
Chrome, particles per million air particles	20.50	97.0
Nickel, particles per million air particles	16.90	77.0
Plumbum, particles per million air particles	8.30	60–760
Cadmium, particles per million air particles	0.91	5–10

Source: compiled by the authors based on (Rostova *et al.*, 2019)

Thus, the problem of recycling worn-out car tires is a common problem that faces all industrialized countries. The solution to this problem is of great environmental and economic importance (table 2).

Table 2. Value of tire recycling in the context of the Smart City concept

Value	Essence
Environmental	✓ Tires that are located for a long time in organized landfills or on other territories are a source of environmental pollution. ✓ They have a high degree of fire hazard. ✓ In the case of burning tires, the process is accompanied by emissions (about 150 different toxic compounds), which are dangerous to human health and the environment.
Economic	✓ Worn tires are a valuable resource. At the same time, tire recycling becomes a priority task in conditions of resource constraints. Recycled raw materials can be reused in various areas of production. ✓ The elimination of tire dumps allows for the release of significant land areas for their more rational use.

Source: compiled by the authors

In this regard, the issue of improving the quality of life, as well as issues of resource-saving technologies, which have become relevant in the context of the irreplaceability of material resources, become a priority in the development of the concept of smart cities.

3.2. Analysis of foreign experience in tire waste disposal

The number of cars on the planet is growing rapidly (figure 1), and the dynamics is exponential. Accordingly, the amount of waste generated increases in proportion to the increase in the number of vehicles. Over the past 20 years, the number of worn tires has increased by about 2 times (Novikov *et al.,* 2019).

Figure 1 confirms that the challenge of recycling used tires is currently a much bigger problem for Russia than for developed foreign countries. Over the past 20 years, the number of passenger cars in Russia has increased by more than 3 times. Consequently, the number of tires in need of recycling has increased proportionally.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
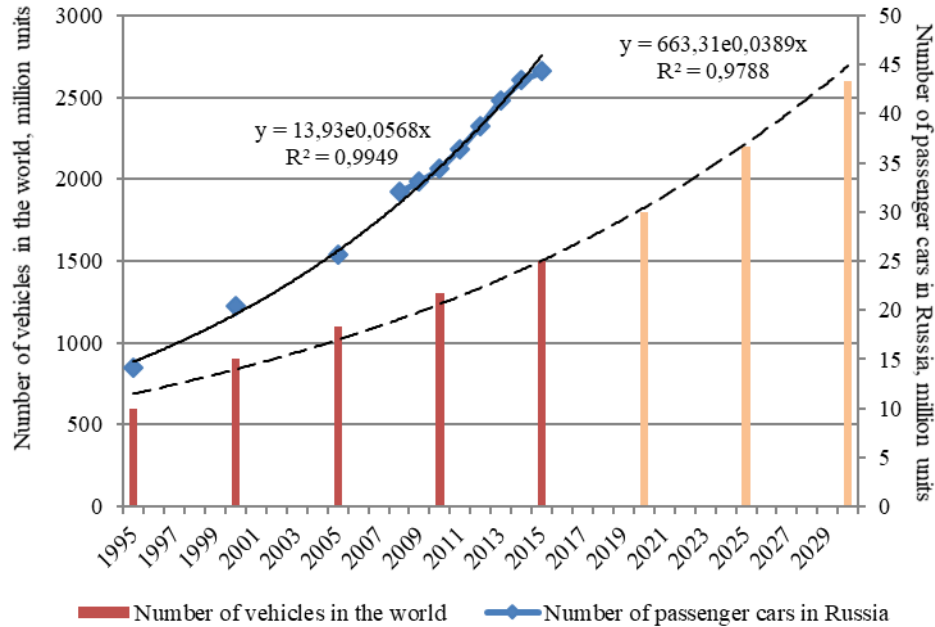
Fig 1. Dynamics of the number of vehicles
Source: compiled by the authors based on (Novikov *et al.,* 2019)

At the same time, the global amount of tire waste according to various estimates ranges from 60 to 80 million tons. The annual increase is approximately 10 million tons of tires (Novikov *et al.,* 2019). Thus, the annual growth rate exceeds 10%. Only in the US, 4.3–4.5 million tons of worn tires are produced per year, in Europe-up to 3 million tons, in Japan – about 1 million tons (Novikov *et al.,* 2019).

However, this is not the case in all countries. For example, in developed countries: Japan, Germany, and the Scandinavian countries, the recycling rate of tires is approaching 100%. If we talk about Europe as a whole, we have determined the average utilization rate, which exceeded 76%, based on table 3 (table 3).

Table 3. Analysis of tire recycling in Europe

Country	Number of tires, million tons	Tire recycling, million tons			Tire recycling, %	Rank
		Construction	Utilization	Energy		
Estonia	15		15		100.00	1
Hungary	36		27	9	100.00	1
Latvian	9		4	5	100.00	1
Romania	34		3	31	100.00	1
Slovenia	15		8	7	100.00	1

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Sweden	80	20	19	40	98.75	2
Finland	51	34	8	8	98.04	3
Denmark	39		38		97.44	4
Austria	63		24	36	95.24	5
Poland	169		35	123	93.49	6
Greece	34	1	15	14	88.24	7
Slovakia	27		17	6	85.19	8
Italy	421	2	118	234	84.09	9
Norway	39	2	11	18	79.49	10
Czech	57		17	28	78.95	11
Portugal	84	1	38	27	78.57	12
Lithuania	23		9	9	78.26	13
Spain	296	6	98	124	77.03	14
France	457	33	92	227	77.02	15
Great Britain	527	34	174	187	74.95	16
Belgium	76		45	10	72.37	17
Germany	582		201	212	70.96	18
Irish	30		12	9	70.00	19
Netherlands	91	1	50	11	68.13	20
Bulgaria	29		15	4	65.52	21
Turkey	260		98	38	52.31	22
Cyprus	5				0	23
Malta	1				0	23
Switzerland	40				0	23
TOTAL	3 590	134	1 191	1 417	76.38	

Source: compiled by the authors based on (Annual tire recycling report for Europe, 2017)

Analyzing the table data, it can be concluded that in countries such as Cyprus, Malta, and Switzerland there is no recycling production. First of all, this is due to the fact that these States are small and all tires that have failed are exported.

If we analyze the most popular tire recycling strategies used in Europe, we can note that only about 1% of the volume is disposed of (figure 2) (Kolganova, 2018). The most popular type of processing is the production of rubber crumb, which is later used for economic purposes, for example, for the manufacture of road surfaces.
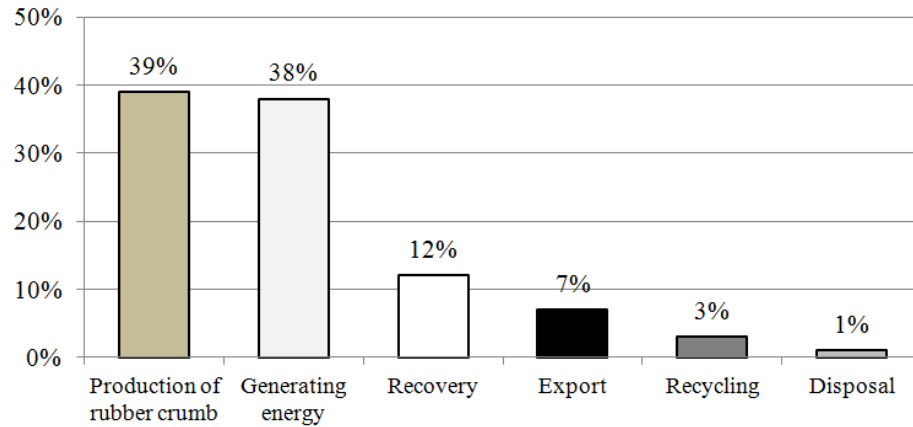
Fig. 2. Strategies for managing worn tires in Europe
Source: compiled by the authors based on (Kolganova, 2018)

To sum up, it should be noted that thermal and mechanical processing are the most popular in Europe (figure 2). In addition, for most developed foreign countries, old tires are a source of valuable raw materials that are usually processed. This is fixed not only in normative documents, but primarily in the minds of the population. If we talk about the legal regulation of the process of recycling tire waste, it should be noted that in Europe, the treatment of worn tires is regulated by three main regulatory documents. By analyzing the international experience of waste tires, it becomes clear that the creation of an effective system of collection and further processing components, the active position of the state in this matter: regulation of the issue at the legislative level, the provision of subsidies to organizations involved in recycling, creating conditions to increase the attractiveness of the sector for its participants (Zvonov *et al.*, 2000). If we talk about the financial side of the issue of recycling of worn tires, there are currently three models for financing the disposal of worn tires in the European Union (table 4).

Table 4. Systems for financing the recycling of used tires in Europe

System	Principle of functioning	Countries that use this system
Tax System	As part of this system, the state introduces tax payments, which serve as the main source of subsidies for processing industries.	Hungary, Denmark, Slovakia, Latvia
Producer Responsibility	Responsibility for disposal lies with the suppliers. The source of financing for recycling processes is a fund to which tire manufacturers transfer money depending on the amount of revenue, including these costs in the cost of new tires.	Sweden, Norway, Finland, Portugal, Poland, France. The transition to this model is expected in Great Britain, Spain, Hungarians.
Free Market System	Each tire owner independently selects counterparty for tire recycling. This model works effectively only in countries with a high standard of living and a level of civil responsibility of the population.	Germany, Italy

Source: compiled by the authors based on (Zvonov *et al.*, 2000)

Today in Europe there are about 40 different companies involved in the recycling of old tires. The main goal of these companies is to collect and process tires in a quantity that would be comparable to the production of new tires. The principle that applies in Europe is "one new tire is sold – one old tire is recycled".

Figure 3 shows the dynamics of tire recycling in European countries. The figure shows that the trend of tire recycling is linear and increasing.
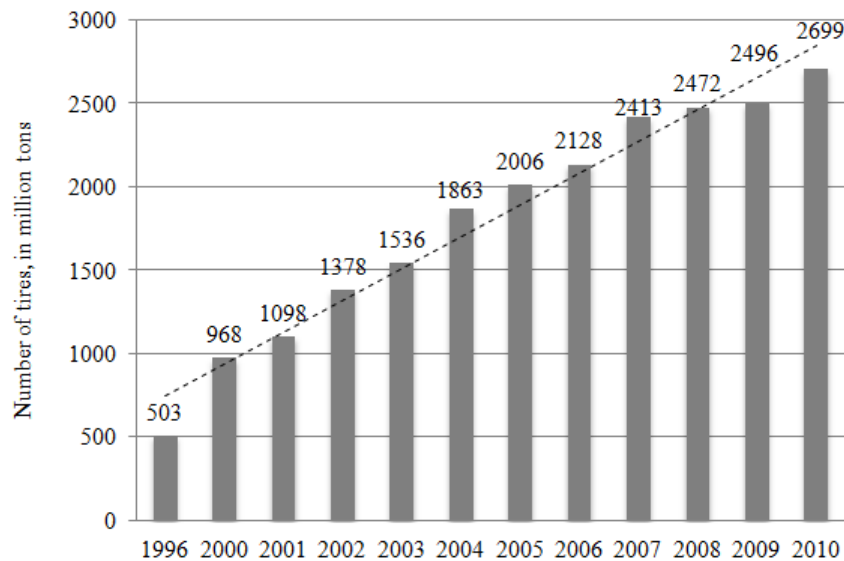
Fig. 3. Dynamics of car tire recycling in Europe
Source: compiled by the authors based on (Rostova *et al.*, 2019)

Considering the issues of tire recycling in the United States, it should be noted that almost all States have adopted special laws and programs that regulate the management of tire waste. It is clear that each of the States has its own nuances regarding tire recycling. However, several similar principles can be identified in the analysis:

✓ financial support for tire recycling is provided by taxes and fees. For example, the amount of payment for the recycling of tires varies from 0.5 to 2$ for passenger car tires, and from 3 to 5$ for a truck;
✓ tire recycling activities (assembly and processing plants) are subject to licensing;
✓ participants in the recycling process: sorters and processors are provided with financial guarantees (Kolganova, Gubanova, 2018).

The Japanese tire recycling system is more than 18 years old. Currently, the country of the rising sun has a "law on waste recycling", according to which every citizen is obliged to personally deliver worn-out tires to the places where they are collected. At the same time, the recycling fee is 300 yen, which in terms of the Russian ruble is about 174 rubles. In parallel, in Japan, there is a law that imposes responsibility for the collection and disposal of tires on the manufacturers of new tires themselves. At the legislative level in Japan, it is stipulated that the reuse of resources obtained during recycling should be at least 70%.

Analyzing the experience of tire recycling in Europe, Japan and the United States, we can draw the following conclusion: regulation of this issue by the state and responsibility, as well as the proactive position of citizens in relation to waste disposal, contribute to the development and effective operation of the industry of recycling old tires. Adopting the experience of the above-mentioned countries, you can achieve both economic benefits from organizing and conducting business activities in the field of recycling broken tires, and improve the environmental situation by recycling unnecessary waste.

3.2. Analysis of Russian experience in tire recycling

Currently, two concepts of urban development are applied in the Russian Federation: the concept of sustainable development, and the concept of smart city. One of the key aspects of these concepts is to improve the environmental situation in the country. Particularly, one of the most important environmental problems is environmental pollution due to the constant increase in tire waste. Therefore, recycling tires is a priority task in the sustainble development of the concept of smart cities in the Russian Federation. It not only reduces the consumption of material resources, but also is a priority in the development of environmental protection and environmental measures. Worn-out tires are subject to the Federal law of the Russian Federation of 1998 No. 89-FZ "on production and consumption waste". It is a waste of the fourth class of danger.

At the same time, the percentage of tire recycling in Russia is much lower than in European countries (Chistov, Pavlov, 2014). It is currently around 5% to 20% according to various estimates (Stets, Chaykun, 2013), while in Europe this figure is approaching 80%. According to "Shinoecology" data (Kolganova, 2018), about 1 million tons of worn-out tires are produced annually in Russia, the change in the dynamics of this indicator is shown in table 5.

Table 5. Estimation of the total number of tires for recycling in the Russian Federation

	The volume of waste tires in Russia, thousand tons	Utilization	
		thousand tons	%
2016	800.0	–	–
2017	729.0	30	3.75
2018	800.0	36	4.50
2019	800.0	70	8.75

Source: compiled by the authors based on (Kolganova, 2018)

The dynamics of growth in the number of tires is still maintained at the present time, as can be seen from figure 4. Moreover, both tires produced in the country and imported tires are subject to recycling on the territory of the Russian Federation. At the same time, as can be seen from figure 5, the share of both tires is growing every year. Moreover, if the trends continue, by 2021 the number of tires imported and produced annually in the Russian Federation will increase by almost 2 times. This makes recycling even more necessary (Shmelev *et al.*, 2018).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
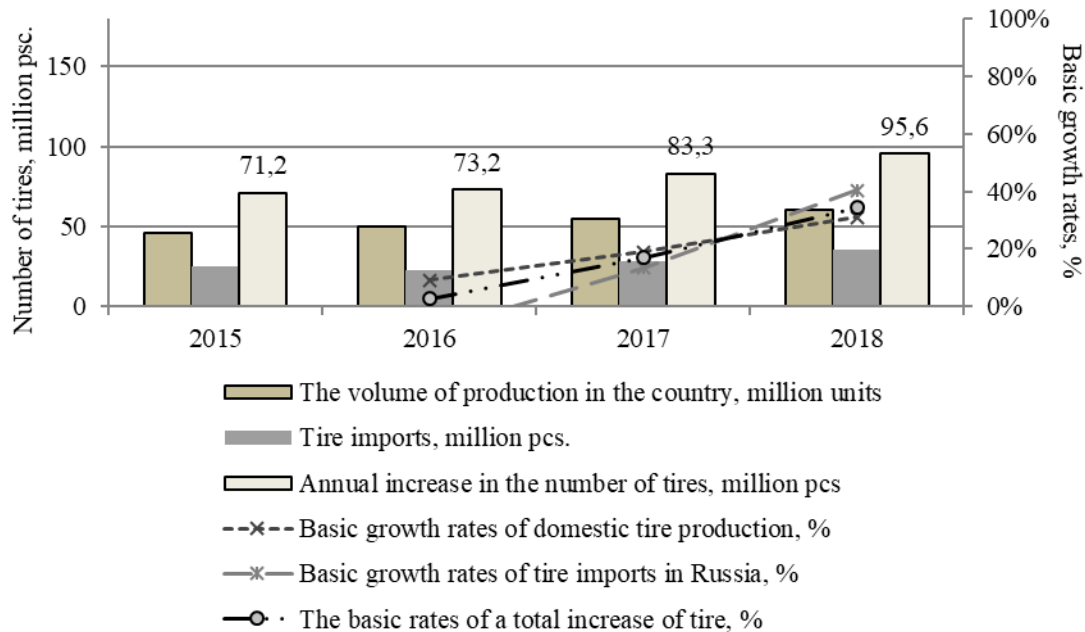
Fig. 4. Analysis of the dynamics of the increase in the number of tires on the territory of the Russian Federation
Source: compiled by the authors based on (Shmelev *et al.*, 2018)

One of the main reasons for the growth of tire production is the increase in the provision of individuals and legal entities with vehicles. Thus, according to the analytical Agency "AUTOSTAT" at the beginning of 2018, the provision of passenger cars in the Russian Federation on average amounted to 290 units per 1000 residents (Rostova *et al.*, 2019). This figure is twice the global average. However, it is significantly lower than the indicators of developed European countries. Almost every second Russian family has a private car, and every sixth has two or more of them.

Clearly, with an increase in the number of cars purchased, the number of tires purchased increases in direct proportion. At the same time, the climatic features of our country force us to purchase 2 types of rubber: for summer and winter time.

At the same time, in Russia, despite the state's policy to improve the environmental situation, citizens have formed an uncompromising attitude to secondary raw materials: for most Russians, this is just garbage, the recycling of which seems useless. In Russia, millions of old tires have accumulated, both in legal and illegal dumps. They are thrown along roadsides, on vacant lots, in courtyards, in forests, even used as fencing for flower beds (Grafkina, Mikhailov, Ivanov, 2009).

However, the transition to the concept of smart cities and the resulting increased attention to environmental issues have given rise to a number of legislative documents, including the decree of the Government of the Russian Federation dated December 28, 2017 No. 2971-R "on approval of standards for waste disposal from the use of goods for 2018-2020". In this document, the following standards for tire recycling were set for the group "Tires, tires and rubber chambers": 2018 – 20%, 2019 – 25%, 2020 – 30%.

However, based on the analysis, it was revealed (table 6) that the plan approved in the decree about tire recycling was not fulfilled.

Table 6. Analysis of the implementation of the tire recycling plan

	Utilization		Planned percentage of utilization according to Decree, %	The percentage of the plan for recycling tires, %
	thousand tons	%		
2017	30	3.75	–	–
2018	36	4.50	20.0	22.5
2019	70	8.75	25.0	35.0

However, despite the fact that the standard for recycling tires in the Russian Federation has been increased by law, the situation still continues to be quite tense. Because the gap between standards and Western countries is significant – in Europe, this figure is approaching 80% (table 3).

Based on the analysis of the trend in the standard of tire recycling in Russia, if the rates set by the Government order are maintained, the Russian economy will be able to reach the average indicators of developed Western countries in 13 years, that is, by 2030.

3.4. Economic aspects of tire recycling in the Russian Federation

It is clear that the adoption of the law on mandatory tire recycling raises a number of issues related to the financing of this event.

To solve this issue, Russia, by analogy with the leading Western countries, has introduced a recycling fee. Moreover, this fee is imposed in general on the purchase of a car, as well as on tires.

At the same time, the recycling fee is understood as a one-time payment in favor of the state, which is used to take environmental safety measures and protect human life and health from harmful emissions during the operation of the vehicle.

Speaking about vehicle recycling in General, then the payment of the recycling fee is regulated by the Federal Law "About production and consumption waste". The law provides for mandatory payment of a recycling fee when purchasing a car.

The amount of the recycling fee required for payment when purchasing a vehicle is calculated by multiplying the base rate by the calculation factor.

Talking about the amount of the base rate present in the formula for calculating the recycling fee, it varies depending on the type of vehicle and is:
- ✓ for non-commercial passenger cars – 20,000 rubles;
- ✓ for commercial passenger cars, as well as trucks and buses – 150,000 rubles.

The coefficient for calculating the amount depends on the year of manufacture of the car (other vehicle) and its parameters: size, weight, engine volume, and is regulated by the Decree of the Government of the Russian Federation No. 1291 of 26.12.2013.

The second direction is to receive a recycling fee from tire manufacturers. These companies are currently required to pay for recycling, as used car tires and cameras were included in the "list of types of production and consumption waste, which includes useful components, the disposal of which is prohibited" from January 1, 2019. The payment is different for the regions of the Russian Federation, so in Chelyabinsk they pay for the disposal of 1 ton of tires – 2000 rubles, in Krasnodar – 3500 rubles.

Recycling tires can be an important source of resource savings. So, if the weight of rubber is 70% of the weight of a worn tire (Afinogenov and et. al, 2016), then if the total volume of tires is processed, which in Russia is about 1 million tons per year (figure 4), you will get about 700,000 tons of rubber.

The saved raw materials can be used as raw materials for rubber products, construction materials, for example, can be used as road pavement.

At the same time, if you continue to burn worn tires, it is necessary to understand that 270 kilograms of soot and 450 kilograms of toxic waste will be released into the atmosphere (Afinogenov and et. al, 2016) per 1 ton of raw materials burned. If we assume that the entire volume of tires in Russia will be disposed of by incineration, then 270 million tons of soot and 450 million tons of gases will be released into the air.

These figures do not fit into the concept of smart cities. In this regard, the first place goes not only to the disposal of tire waste, but also to the use of environmentally friendly methods of their disposal.

4. Conclusions

According to the analysis of the international experience of urban development in accordance with the above concepts, one of the key areas of implementation of the concepts is the environmental aspect.

Almost all researchers agree on the need to resolve the issues related to waste disposal, which increases with the quality of life. Along with this, everyone notes the need to resolve issues with the growth of tire waste.

Despite the beginning of the implementation of sustainable development and smart city concepts, today Russian cities have much more significant issues than European ones. Based on the analysis, only about 20% of these wastes are currently disposed of, while in European countries this value is more than 80%. This discrepancy leads to the need to apply international experience in solving the problem of tire waste disposal in Russian cities.

For example, analyzing the European experience, experts say that the model of "manufacturer and importer Responsibility" for tire recycling, which is used in most European countries that were able to completely free their territories from the rubble of worn tires in 10-15 years, should be applied in our country.

There are several main reasons for the existing of problems with utilization of automobile tires in Russia, among them: the lack of a developed market for collecting tires, and the lack of a market for the sale of products for processing worn tires.

At the same time, modern Russia is only developing in this area. Until recently, the state did not encourage the work of enterprises related to the handling of tires (collection, transportation, storage and processing). Car rubber processors were left to their own devices, as their activities were not regulated, and this type of activity is quite risky. But recently, a number of bills have been passed that have greatly improved the situation in this type of business. In addition, leasing companies are willing to work with equipment for recycling tires, which also has a positive effect on the activities of organizations.

Taking into account eco-friendly ways of recycling tire waste is becoming one of the important directions in the transition of Russian cities to the concept of Smart City".

References

Ahvenniemi, H., Huovila, A., Pinto-Seppä, I., Airaksinen, M. 2017. What are the differences between sustainable and smart cities?. *Cities* 60: 234–245. https://doi.org/10.1016/j.cities.2016.09.009

Annual tire recycling report for Europe 2017. – available at: https://www.etra-eu.org/

Arulrajaha, A., Mohammadinia, A., Maghoola, F., Horpibulsuk, S. 2019. Tire derived aggregates as a supplementary material with recycleddemolition concrete for pavement applications. *Journal of Cleaner Production,* 230: 129-136. https://doi.org/10.1016/j.jclepro.2019.05.084

Chistov, D.V., Pavlov I.M., 2014. Analysis of business processes in the development of investment projects. Moscow: Synergy, 421.
Costi, P., Minciardi, R., Robba, M., Rovatti, M., Sacile, R., 2004. An environmentally sustainable decision model for urban solid waste management. *Waste Management*, 24(3): 277-295. https://doi.org/10.1016/S0956-053X(03)00126-0

Decree of the Government of the Russian Federation of December 28, 2017 No. 2971-r "On the standards for the disposal of waste from the use of goods for 2018-2020."

Dong, L., Fujita, T. 2015. Promotion of low-carbon city through industrial and urban system innovation: Japanese experience and China's practice. *World Scientific Reference on Asia and the World Economy*, 257–279. https://doi.org/10.1142/9789814578622_0033

Dong, L., Liang, H., Zhang, L., Gao, Z., Hu, M. 2017. Highlighting regional eco-industrial development: Life cycle benefits of an urban industrial symbiosis and implications in China. *Ecological Modelling*, 361: 164–176. https://doi.org/10.1016/j.ecolmodel.2017.07.032

Fagundes, L.D., Amorim, E.S., da Silva Lima, R. 2017. Action Research in Reverse Logistics for End-Of-Life Tire Recycling. *Systemic Practice and Action Research*, 30: 553–568. https://doi.org/10.1007/s11213-016-9408-1

Federal Law of the Russian Federation of 1998 No. 89-FL "On Production and Consumption Wastes.

Ghosh, A., Sarkar, J.P., Das, B. 2019. Sustainable Energy Recovery from Municipal Solid Waste (MSW) using Bio-reactor Landfills for Smart City Development. 1st IEEE International Conference on Sustainable Energy Technologies and Systems, ICSETS, 242–246. https://doi.org/10.1109/ICSETS.2019.8745334

Grafkina, M.V., Mikhailov, V.A., Ivanov, K.S. 2009. Ecology and environmental safety of a car. Moscow, FORUM, 2009.

Gupta, P.K., Shree, V., Hiremath, L., Rajendran, S. 2019. The use of modern technology in smart waste management and recycling: Artificial intelligence and machine learning. *Studies in Computational Intelligence,* 823: 173–188. https://doi.org/10.1007/978-3-030-12500-4_11

Kolganova, N.V., Gubanova, E.V. 2018. Actual directions of increasing financial activity and solvency of the group of waste recycling. *Models, systems, network in economics, technology, nature and society*, 3(27): 59–70.

Liang, S., Zhang, T. 2012. Comparing urban solid waste recycling from the viewpoint of urban metabolism based on physical input-output model: A case of Suzhou in China. *Waste Management*, 32(1): 220–225. https://doi.org/10.1016/j.wasman.2011.08.018

Long, J. 2018. Automobile Electronic Control Network Design Based on CAN Bus. Proceedings of 3rd International Conference on Intelligent Transportation, Big Data and Smart City, ICITBS 2018: 9–12. https://doi.org/10.1109/ICITBS.2018.00010

Machado Junior, C., Ribeiro, D., Pereira, R., Bazanini, R., 2018. Do Brazilian cities want to become smart or sustainable? *Journal of Cleaner Production*, 199: 214–221. https://doi.org/10.1016/j.jclepro.2018.07.072

Marina Meireles Pereira, Ricardo Luiz Machado, Silvio Roberto Ignacio Pires, Pereira Dantas, M.J., Patricia Regina Zaluski, Enzo Morosini Frazzon 2018. Forecasting scrap tires returns in closed-loop supply chains in Brazil. *Journal of Cleaner Production,* 188: 741–750. https://doi.org/10.1016/j.jclepro.2018.04.026

Maryono, M., Hasmantika, I.H., 2019. Preliminary Study of Smart Urban Waste Recycling in Semarang, Central-Java, Indonesia. IOP Conference Series: Earth and Environmental Science, 248 (1), 012048. https://doi.org/10.1088/1755-1315/248/1/012048

Nižetić, S., Djilali, N., Papadopoulos, A., Rodrigues, J., 2019. Smart technologies for promotion of energy efficiency, utilization of sustainable resources and waste management. *Journal of Cleaner Production,* 231: 565–591. https://doi.org/10.1016/j.jclepro.2019.04.397

Novikov, S., Amirova, E., Kosykh, E., Chudinovskikh, M., Nikolaevskaya, O., 2019. Strategic planning and management of high-tech developments and innovative technical solution. *Research in World Economy*, 10(3): 309-314. https://doi.org/10.5430/rwe.v10n3p309

Rostova, O., Shirokova, S., Sokolitsyna, N. 2019. Management of project for automation of investment control at industrial enterprise. *IOP Conference Series: Materials Science and Engineering*, 497(1): 012017. https://doi.org/10.1088/1757-899X/497/1/012017

Rostova, O., Shirokova, S., Sokolitsyna, N., Shmeleva, A. 2019. Management of investment process in alternative energy projects. *E3S Web of Conferences*, 110: 02032. https://doi.org/10.1051/e3sconf/201911002032

Sagar, M., Nibedita, K., Manohar, N., Lachit, P., Jayaramudu, J. 2018. A potential utilization of end-of-life tyres as recycled carbon black in EPDM rubber. *Waste Management*, 74: 110–122. https://doi.org/10.1016/j.wasman.2018.01.003

Saptadi, N.T.S., Chyan, P., Pratama, A.C., 2019. Geographic Information System for Waste Management for the Development of Smart City Governance. IOP Conference Series: Materials Science and Engineering, 854, 1: 012040. https://doi.org/10.1088/1757-899X/854/1/012040

Shmelev, S.E., Shmeleva, I.A., 2018. Global urban sustainability assessment: A multidimensional approach. *Sustainable Development*, 26(6): 904–920. https://doi.org/10.1002/sd.1887

Sienkiewicz, M., Janik, H., Borzeowska-Labuda, K., Kucinska-Lipka, J. 2017. Environmentally friendly polymer-rubber composites obtained from waste tyres: A review. *Journal of Cleaner Production*, 147: 560–571. https://doi.org/10.1016/j.jclepro.2017.01.121

Stets, A.A., Chaykun, A.M., 2013. Environmental and economic aspects of the processing and use of used car tires News MGTU "MAMI", 1(15): 34–45.

Tsai, W.-T., 2015. The Utilization of Scrap Tires as an Energy Source and Its Environmental Benefit Analysis in Taiwan. Energy Sources, Part B: Economics, *Planning and Policy,* 10(4): 333–339.

Urban world: Mapping the economic power of cities, 2011. https://www.mckinsey.com/featured-insights/urbanization/urban-world-mapping-the-economic-power-of-cities

Wang, Q.-Z., 2020. Waste tire recycling assessment: Road application potential and carbon emissions reduction analysis of crumb rubber modified asphalt in China, *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2019.119411

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Zhang, A., Venkatesh, V.G., Liu, Y., Wan, M., Qu, T., Huisingh, D., 2019. Barriers to smart waste management for a circular economy in China. *Journal of Cleaner Production,* 240: 118198. https://doi.org/10.1016/j.jclepro.2019.118198

Zhang, X., Bayulken, B., Skitmore, M., Lu, W., Huisingh, D., 2018. Sustainable urban transformations towards smarter, healthier cities: Theories, agendas and pathways. *Journal of Cleaner Production,* 173: 1–10. https://doi.org/10.1016/j.jclepro.2017.10.345

Zhao, Y., Gao, Y., Shi, Y., Dong, F., Wang, Y., 2018. New method for making and selecting the compaction plan of asphalt pavement based on compaction quality and carbon emissions. *Journal of Cleaner Production,* 181: 385–398. https://doi.org/10.1016/j.jclepro.2018.01.257

Zvonov, V.A., Kozlov, A.V., Kutenev, F.V. 2000. Ecological safety of the car in a full life cycle. *Automotive industry,*11.

Tatyana KHUDYAKOVA is Doctor of Science (Economics) and the Head of the Department "Applied Economics" South Ural State University (National Research University), Russia. Research interests: entrepreneurship and regional development; innovation and small firms; small firm internationalization; sustainability. Scopus ID 57190005672.
ORCID ID: https://orcid.org/0000-0001-5397-0498

Andrey SHMIDT is Doctor of Science (Economics) and the Professor of the Department "Applied Economics" South Ural State University (National Research University) and prorector, Russia. Research interests: entrepreneurship and regional development; innovation and small firms; small firm internationalization; sustainability. Scopus ID 56712529300.
ORCID ID: https://orcid.org/0000-0003-3575-6898

Svetlana SHMIDT is undergraduate student of the Department "Mathematics and Computer Science" Saint-Petersburg State University, Russia. Research interests: application of mathematical methods in applied research and computer science.
ORCID ID: https://orcid.org/0000-0002-8967-0611

Publisher
http://jssidoi.org/esc/home

EXPLICATING ENERGY SAVING INTENTION FROM THE PROSPECT OF SMALL MEDIUM ENTERPRISES

Phuong V. Nguyen [1*], Khoa T. Tran [2]

*[1,2] International University, Vietnam National University,
Quarter 6, Linh Trung Ward, Thu Duc District, Ho Chi Minh City, Vietnam*

E-mails: [1]nvphuong@hcmiu.edu.vn (Corresponding author); [2] ttkhoa@hcmiu.edu.vn*

Abstract. Saving energy at workplaces has become a major concern in enterprises because it offers a valuable opportunity to reduce energy consumption and lessen carbon dioxide emissions, which affect the global climate change and human health. This study integrated and extended both theories of planned behavior and social information processing to identify key determinants that influence on middle managers' energy saving intention at workplaces. By using the Partial Least Squares-Structural Equation Modeling (PLS-SEM) method to scrutinize a data survey of 336 middle managers in small medium enterprises located in Ho Chi Minh City (HCMC), Vietnam. The findings confirmed the central role of top management support in stimulating middle managers to engage in energy saving responsibility. Moreover, under social pressure, managers are willing to change and enhance subordinates to reduce energy consumption. Meanwhile, perceived environmental responsibility has a significant indirect impact on energy saving intention through proactive behavior, but not a direct impact. Based on the results, this study enriched the literature on energy saving behavior and drew managerial implications for enterprises

Keywords: energy saving intention; social pressure; top management support; proactive behaviour; openness toward change; perceived environmental responsibility; SMEs

Reference to this paper should be made as follows: Nguyen, V.P., Tran, T.K. (2020). Explicating Energy Saving Intention from the Prospect of Small Medium Enterprises. *Entrepreneurship and Sustainability Issues*, 8(2), 716-734. http://doi.org/10.9770/jesi.2020.8.2(43)

JEL Classifications: M12, M14, Q01

1. Introduction

The worldwide energy consumption has been rapidly increasing over the last decade (Zhang, Wei, and Zhou, 2018). The International Energy Agency reports that the demand for energy is forecasted to rise by nearly 35% from present until 2035 (Tan, Ooi, & Goh, 2017). Consequently, energy prices have gone up, meanwhile the world energy supplies have been unstable (Bissing-Olson et al., 2013; Tang, Warkentin, and Wu, 2019).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Moreover, the fast rising energy consumption has caused numerous environmental problems as well as enhanced the global climate change, which has obstructed sustainable development. As one of the most dynamic emerging countries in East Asia region, Vietnam has increased energy demand by 10% per year. In reference (Le, 2019), the current energy consumption is extremely inefficient. Electricity consumption has surged by nearly 13% per annum. The demand for generation capacity increased from 8.7 GW in 1990 to 27 GW in 2000 and achieved greater than 48 GW in 2018. Primary energy consumption increased from 31 million tons of oil equivalent in 2005 to around 75 million tons in 2017.

As the process of fundamental industrialization is attained, the structure transformation process transits gradually to high-efficiency industries with less energy consumption, and economic growth of countries impels decrease in the energy intensity of Gross Domestic Product (GDP) (Burke & Csereklyei, 2016). Accessing to World Bank database (World Bank, 2019), the quantity of primary energy in terms of (MJ) per GDP (2011 PPP) presented in Figure 1. In 2015, Vietnam's energy intensity was 5.9, which is higher than in India (4.7) and other ASEAN (such as Malaysia (4.7), Singapore (2.4), Philippines (3.1), Indonesia (3.5), Thailand (5.4), Myanmar (3.1), Lao (5.2)). It implies that Vietnam has been using highly energy for a unit of economic output. The main concern is that the increase in energy consumption induces higher carbon dioxide (CO_2) emissions and other greenhouse gasses, which affect the global climate change and human health (Tang et al., 2019; Wang, Zhang, and Li, 2014).
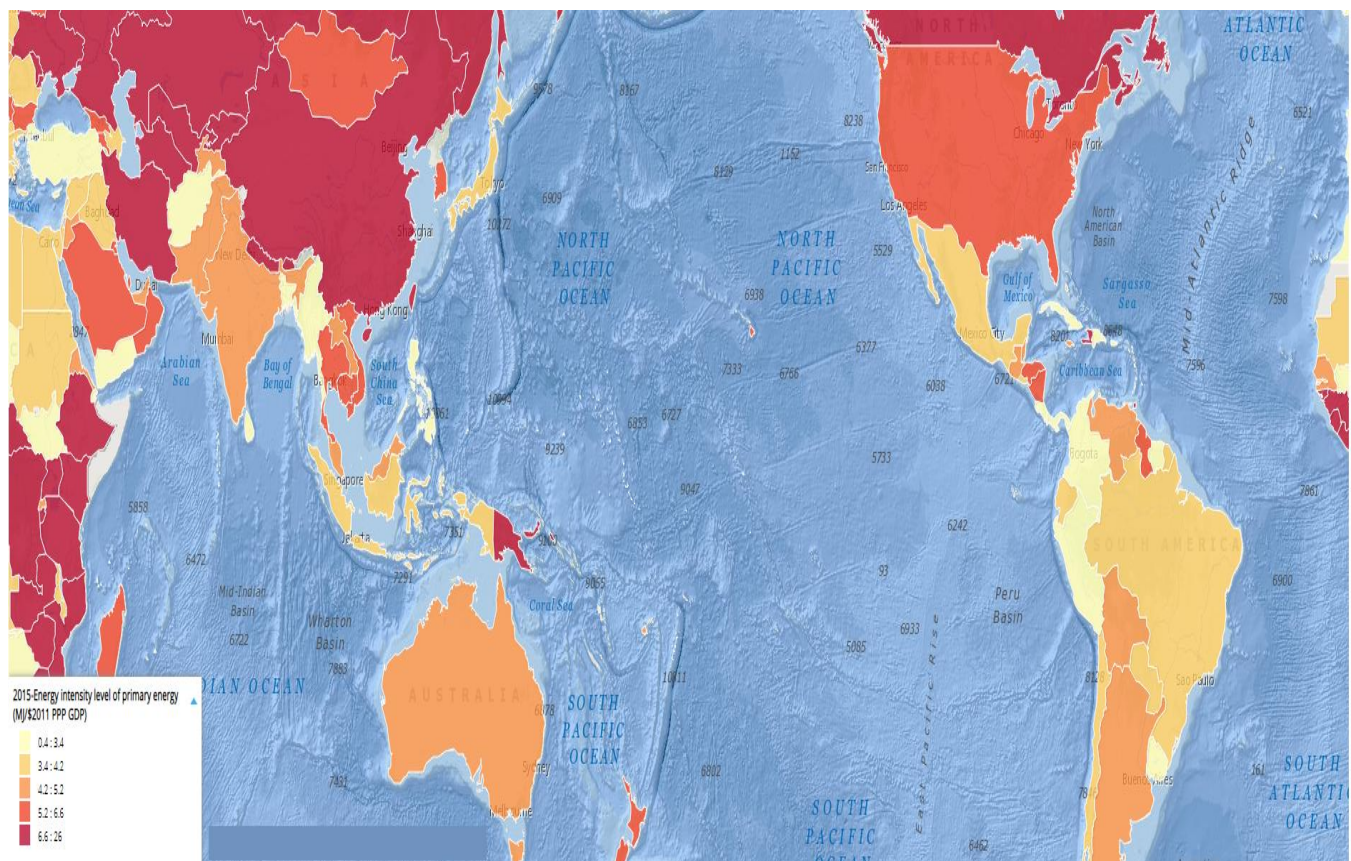
Figure 1. Primary energy (*Source:* World Bank)

In the other side, pursuing the environmental protection programs is adversely diminishing the profitability of many companies (Scherbaum, Popovich, & Finlinson, 2008), thus researchers and practitioners are seeking for solutions lessen energy consumption at workplaces (Gao et al., 2017; Leygue, Ferguson, and Spence, 2017; Tang et al., 2019; Zhang, Wang, and Zhou, 2014). The academic literature proposes that to reduce energy consumption at workplaces, companies seek for transforming organizational structure and changing operations management such as investing in energy-efficient equipment (Scherbaum et al., 2008). However, purchasing energy-efficient products and enhancing efficient energy use are not enough to reduce energy consumption in long periods of time due to the so-called "rebound effect" (Chitnis et al., 2013; Gao et al., 2017). When using energy-efficient machinery, people seem to consume more electricity. For instance, people may turn on an air condition for longer hours or set a lower temperature since they believe in new technology for greater energy savings.

Because of this puzzlement, energy saving behavior has attracted into an emerging research field. According to Scherbaum et al. (2008), enterprises and their workers are one of the numerous users of the global energy. Various enterprises have recognized the significant role of managers and employees in saving energy at workplaces and searched for guidance procedures to ensure employees stay proactively engaged with energy saving (Zhang et al., 2014). However, many present studies on energy saving behavior at the individual level primarily concentrated on energy saving of households (Liu et al., 2020; Wang, Lin, & Li, 2018; Yue, Long, & Chen, 2013). Whereas other prior studies largely explored customers' attitudes toward using energy efficiency (Gadenne et al., 2011; Hua and Wang, 2019). In addition, the present literature on energy consumption at workplaces substantially focuses on employee energy saving behavior (Tang et al., 2019; Zhang et al., 2014). A research gap still exists in examining the role of middle managers in energy consumption behavior in Small Medium Enterprises (SMEs), although the many attempts have been conducted to bridge it. Enterprises expect employees, particularly middle managers, devote more effort as well as engage change-oriented behaviors (Griffin, Parker, & Mason, 2010). By pursuing innovative ideas and initiating and implementing changes, managers have to seek for appropriate solutions to reduce energy consumption and adapt to new environmental laws, as well as overcome particular challenges to keep their job. Thus, we investigate which determinants lead to middle managers' proactive behavior and energy saving intention at workplaces.

Extant research on the energy saving at workplaces has largely concentrated on employees' attitude and exercised the conceptual framework based on the theory of planned behavior (TPB) (Ajzen, 1991) to clarify energy saving behavior of employees (Gao et al., 2017). Other studies extended rational choice theory to illustrate that energy saving behavior of employees is based on the cost-benefit analysis (Leygue et al., 2017; Zhang et al., 2014). In addition, in the recent study, Bao, Wang, & Sun (2019) employed social information processing theory to evaluate the mediating role of middle managers in adapting environmental regulations and implementing proactive behavior at workplaces. Meanwhile, another study of Tang et al. (2019) employed stimulus-organism response theory to develop the research framework. The scholars attempt to identify the factors motivating employees' energy-saving intention. In this study, we integrated and expanded both theories of TPB and social information processing to develop the conceptual framework to answer the key research question above.

This paper makes several essential contributions to our knowledge of this crucial phenomenon. First, it examines the determinants that lead middle managers' energy saving intention in SMEs, hence this research field has been extended in the new context. Second, while most previous research mainly employed one of common theories (e.g. TPB, rational choice theory, stimulus-organism response, and social information processing), this paper integrated and extended both theories to clarify the central role of top management support in connecting explanatory factors (e.g. social pressure, openness toward change, proactive behavior) that influence on middle

managers' energy saving intention. Finally, this research is expected to provide fruitful insights to assist policymakers to stimulate middle managers to engage in energy saving responsibility.

The remaining of this paper is structured as follows. The following section reviews the prior literature on energy saving intention and relevant theories to build the research model. Then, Section 3 describes the research methodology and data collection. Data analysis and empirical results are presented in Section 4. In Section 5, we discuss the research findings and highlight theoretical and managerial contributions. The final section presents conclusions with the limitations.

2. Literature review

2.1. Energy saving intention
Many technical solutions have been created to reduce energy consumption that behavioral changes have substantially favorable influences on decreasing carbon emissions and fighting global warming (Tang et al., 2019; Zhang et al., 2018). Therefore, the behavioral trend has appealed immense attentions from scholars in the current period. Previous studies of energy-saving behavior has concentrated on individual settings (Al-Shemmeri and Naylor, 2017; Gao et al., 2017), instead of companies' energy-saving behavior. Several studies have also attempted to investigate how socio-demographics and psychological factors relate to energy-saving goals. For instance, in reference (Ding et al., 2017), it illustrated that urban residents in China are more likely to engage in energy-saving activities than rural residents. Likewise, another study in China showed that females paid more attention to energy saving than male due to the Chinese family culture, wives are often responsible for controlling household expenditure (Yang, Zhang, & Zhao, 2016). In addition, other studies investigated the linkage between energy saving behavior and psychological factors by examining specific variables of psychological components (e.g. attitude, values, beliefs, and social norms) (Frederiks, Stenner, & Hobman, 2015; S. Wang et al., 2018).

In recent studies, scholars have also started to investigate the determinants of employees' energy-saving behavior at workplaces (Gao et al., 2017; Tang et al., 2019). They have explored the possible influences of employees' socio-demographics and psychological components on energy-saving behavior. For instance, by conducting a questionnaire survey from United Kingdom college employees, the scholars found that socio-demographic features, such as commute category, social altruism, homeowner status, and use of home green appliances, affected employees' commitment to actual energy savings at workplaces (Al-Shemmeri & Naylor, 2017). Another study on Chinese office workers proved that worker's attitude, perceived behavior control, descriptive and personal moral norm have a significantly positive impact on energy-saving behavior (Gao et al., 2017). Similarly, by analyzing data from Chinese office employees, Tang et al. (2019) found that energy saving intention had a positively significant relationship with both employee's social pressure and perceived energy saving responsibility.

2.2. Top management support
Top managers are responsible for making the organizational decisions, are critical for organizational. Several prior studies have examined the effect of top managers on companies' energy-saving behavior. For instance, Blass et al. (2014) analyze data collection from top operations managers of small medium manufacturing firms in the United States. They find that the top operations managers' engagement significantly raises the adoption energy-efficiency initiatives. Whereas, Zhang, Wang, and Lai (2015), conducting a data survey of senior managers from industrial firms in China, show that senior managers' environmental concern mediates between firms' operational practice and energy-saving strategy.

According to Schumpeterian viewpoint of competition, companies are able to gain competitive advantages over time by executing actions (Jacobson, 1992). Environmental management activities are a kind of actions that companies can execute to achieve a sustainable competitive advantage (Dai, Montabon, & Cantor, 2014). Therefore, under the competitive pressure, company leaders should support for the environmental initiatives to gain a competitive advantage. Moreover, Zhang et al. (2018) show that top management support has a significant impact on energy-saving behavior. In addition, executing environmental initiatives requires many resources such human, capital, technologies. With the top management support, these resources are given to a remarkable extension. So, the first hypothesis was proposed:

H1. Top management support is a positive influence on energy saving intention.

2.3. Social pressure

Social pressure, one type of the subjective norms, confers to the pressure level of an individual perceived from essential others to carry or not carry the behavior (Frederiks et al., 2015; Tang et al., 2019; Wang et al., 2018). It means that if an individual perceives the substantial other people such as friends, colleagues, leaders, or relatives, expect him or her to pledge a specific behavior, he/she is more likely to employ the behavior. When managers have to perform four primary functions such as planning, organizing, leading and controlling at workplaces, they may feel more pressure not to do the right things under social pressure on environmental management activities. Therefore, they may create some approaches to motivate employees to reduce energy use in the workplace. They also face social pressure to commit to solve societal and environmental problems. Specifically, top-level managers want to follow opportunities and strategies that deal with environmental and social factors to gain sustainable development (Jahanshahi & Brem, 2017). Previous empirical results showed that social pressure is a key determinant of energy saving intention (Wang et al., 2018; Yue et al., 2013). In the recent empirical study on Chinese office workers, Tang et al. (2019) find that social pressure is positively associated with energy saving intention in the workplace. Another recent study on 207 families in northwest China also finds out that subject norm has a significant influence on energy saving intention at home. Hence, the following hypotheses were proposed:

H2. Social pressure has a significant effect on energy saving intention.
H3. Social pressure is a significant effect on top management support.

2.4. Proactive behavior and openness toward change

Proactive behavior is broadly defined as "taking initiative in improving current circumstances or creating new ones; it involves challenging the status quo rather than passively adapting to current conditions" (Crant, 2000). General components of proactive behavior involve actively searching out information, determining room for improvement, establishing constructive change-oriented recommendations and figuring out appropriate ways to improve a circumstance (Bao et al., 2019). This paper explored perceptions of environmental regulation. Middle managers need to change their attitudes and behaviors to comply with the environmental laws and regulations. Based on social information processing theory, middle managers are supposed to be more open to change, particularly since environmental laws stimulates middle managers to acknowledge the need for change (Bao et al., 2019).

Previous studies have shown that proactive behavior has a strong linkage with individual and organizational outcomes such as entrepreneurial behaviors (Becherer & Maurer, 1999), sales performance (Crant, 1995), individual innovation (Seibert, Kraimer, & Crant, 2001), and small-firm innovation (Kickul & Gundry, 2002). Moreover, some scholars also investigate the relationships among the individual and work environment determinants with proactive behavior at workplace. For instance, using data collection from United Kingdom wire makers, Parker, Williams, & Turner (2006) identify direct antecedents such as job autonomy, flexible role

orientation and role breadth self-efficacy, which have a positively significant impact on proactive behavior. By analyzing a data collection of 491 supervisors from 32 Australian state organizations, Griffin, Neal, & Parker (2007) show that open to change has a positive relationship with proactivity in all terms of organization member, team member, and individual task. Moreover, to explore other potential antecedents, in a recent study, Bao et al. (2019) illustrate that openness toward change has a positive impact on proactive behavior.

Prior studies on proactivity have proposed that the settlement to pledge in proactive behaviors needs information sharing. For instance, managers should motivate employees to express proactive behavior at workplace. In other words, organizations that concentrate on increasing employee proactivity need to invest in many kinds of supportive mechanisms in terms of competence development and information sharing. The more transparent information, the better employees can focus on improving their performance instead of being disappointed by feeling of unrecognized their contributions (Maden, 2015). Moreover, quality of information given to employees enables them to understand potential problems and recognize opportunities. Therefore, managers need to provide reliable information to help employees to forecast and understand what affect their working climate in advance (Escrig-Tena, Segarra-Ciprés, García-Juan, & Beltrán-Martín, 2018; Grant & Ashford, 2008). Based on the prior results, the following hypotheses were proposed:
H4: Top management support has a positive relationship with openness toward change.
H5: Openness toward change has a positive relationship with proactive behavior.
H6: Top management support has a positive relationship with proactive behavior.

2.5. Perceived environmental responsibility

Perceived environmental responsibility reflects individual's behavior to environment protection. For instance, Lee (2009) investigates gender difference in perceived environment responsibility through data survey of 48 high schools in Hong Kong. The findings show that both female and male concern perceived environmental responsibility when buying green products. With this perception, consumers would consider high-carbon consumption as irresponsible and selfish actions. In other words, they would have a sense of responsibility and engage in pro-environmental behaviors (Rice, 2006; Wang, Wei, and Zhang, 2019). In addition, they could also search for improving their standing by implementing environmentally friendly practices (Lee, 2009). In this study, we explore how managers' responses to environmental responsibility at workplace. We suppose that managers play an essential role in leading to environmental awareness. Moreover, according to the face negotiation theory, as perceiving an environmental responsibility, managers who are concerned with preservation of their face consciousness would intend to pursue energy saving measures since they can attain face and status power by participating into environmental protection to create a positive image at work (Wang et al., 2019).

Furthermore, according to the theory of planned behavior (TPB), behavioral intention is influenced by three factors (subjective norms, perceived behavioral control, and attitude towards behavior). Other previous studies have expanded the TPB by appending descriptive norms to reflect the new social influence, and proposed enlarged explanatory power of behavioral intention (Cristea, Paran, and Delhomme, 2013; Forward, 2009; Li et al., 2019). Specifically, descriptive norms have played an important role in considering solar with a low perceived behavioral control (Rai & Beck, 2015). In general, the TPB is proved as an appropriate framework to estimate energy-saving behaviors (Kaiser & Gutscher, 2003; Li et al., 2019; Rai & Beck, 2015; Scherbaum et al., 2008). This paper extended the TPB by considering perceived environmental responsibility as predicting energy-saving intention at workplaces. Moreover, it is worth noting that perceived behavioral control is an essential determinant of behavioral intention in several studies (Botetzagias, Dima, & Malesios, 2015; Hua & Wang, 2019; Lizin, Van Dael, & Van Passel, 2017; Ru, Wang, & Yan, 2018). Some external situations, including time, cost, resources, managerial skills and knowledge, are possibly free from individual control, and hence influence personal intention

to join in a particular practice (Ru et al., 2018). In this paper, we suppose that proactive behavior is considered as one specific type of perceived behavioral control. If managers feel responsibilities for their tasks and have management skills and relevant knowledge to save energy at workplace, they attempt to seek for appropriate ways to conserve energy. It implies that perceived environmental responsibility could influence both energy saving intention and proactive behavior. Thus, the following hypotheses were proposed:

H7: Perceived environmental responsibility is positively associated with energy saving intention
H8: Perceived environmental responsibility is positively associated with proactive behavior
H9: Proactive behavior is positively associated with on energy saving intention

Albeit the previous studies shed light on the energy saving behavior, the research endeavor in this field is still at an initial stage. Most of the present literature has concentrated on either household energy savings or office workers. Middle managers in SMEs comprise a crucial goal group for determining energy saving, but little research attempt has been expanded to investigate what motivates middle managers to save energy at workplaces. To fulfill this gap in the literature, we integrate both theories (TPB and social information processing) to build a research model for examining the role of social pressure, top management support, internal psychological behaviors (proactive behavior) and perceived environmental responsibility in energy saving intention in SMEs. Figure 2 presents the integrated research model.

Figure 2. The research model

3. Research design

3.1. Measurements

All measured items were adapted from previous literature with some adjustments to conform the research context in Vietnam. The questionnaire was initially developed in English version. We followed three procedures to complete the questionnaire. First, the questionnaire was translated into Vietnamese by researchers whose mother language is Vietnamese. Second, we conducted a focus group with two professors and three managers to help us to check the Vietnamese questions. Hereafter, they suggested some adjustments to ensure respondent understand the questions. Third, a pilot test with 20 managers was implemented to satisfy no errors and appropriate contends. We designed a five-point Likert scale ranging from "strongly disagree" to "strongly agree" for all items.

The latent variable of social pressure is adapted from (Tang et al., 2019; Wang et al., 2014) with four items. Two sample items include "my colleagues expect me to save energy" and "I feel pressured due to the energy-saving activities of my colleague". The construct of energy-saving intention is developed from (Gao et al., 2017; Park and Kwon, 2017; Tang et al., 2019) with four items. A sample item includes "I am willing to save energy for my company". Perceived environmental responsibility including five items is adapted from (Lee, 2009; L. Wang et al., 2019). A sample modified item consists of "I strongly agree that more environmental protection works are needed at workplaces". Top management support consisting of four items is adapted from (Wang et al., 2018). The latent variable of openness toward change is developed by (Bao et al., 2019; Miller et al., 1994). Proactive behavior is a second order factor including three sub-factors such as organization member, team member, and individual task (Griffin et al., 2007). This factor is adapted from (Bao et al., 2019; Griffin et al., 2007). The measured items with denotes and their sources are presented in Appendix A, Table A1.

3.2. Data collection

A questionnaire survey approach was used to collect data. All respondents are middle managers from SMEs. It took five months to complete the data collection from June to November 2019. After modifying the questionnaire for appropriate research context in Vietnam, the questionnaire was deliverd to 400 middle managers of SMEs. It worth noting that the Center for Customer Service of Vietnam Electricity in HCMC assisted to select potential respondents. Particularly, it first introduced the authors to contact with 40 middle managers to conduct the survey. And then, like a snowballing approach, these managers continued to introduce us to contact other managers. In addition, the authors also received valuable supports for conducting the survey from MBA students, who are placed in the position of managers in enterprises. Finally, after checking all returned questionnaires, responses with missing information were removed. As a result, 336 responses were used for data analysis.

4. Results

4.1. Demographic characteristics

Demographic characteristics consisted of gender, age, education, managing field, and exprerience in the management position. Most respondents are male and account for 80.95% of the total respondents. 47.02% of the respondents were between 41 and 49. For the educational level, most of the respondents held a bachelor's degree or higher. 44.05% of the respondents had management experience in production factory. Finally, 50.60% of the respondents had more than 15 years in the management position. Table 1 presented the demographic profile of the respondents.

Table 1. The respondents' demographics

Characteristics	Items	Count (N=336)	Percent
Gender	Male	272	80.95
	Female	64	19.05
Age	25-30	58	17.26
	31-40	71	21.13
	41-49	158	47.02
	> 50	49	14.58
Education	Bachelor Degree	260	77.38
	Master Degree	72	21.43
	PhD. Degree	4	1.19
Manager in	Finance/Accounting	64	19.05
	Production factory	148	44.05
	Marketing	29	8.63
	Plan and development	47	13.99
	Material supply	28	8.33
	Customer services	16	4.76
	Others	4	1.19
Experience in the management position	< 3 year	18	5.36
	3 – 5 years	22	6.55
	5 – 10 years	37	11.01
	10 – 15 years	89	26.49
	> 15 years	170	50.6

4.2. Analysis and results

PLS-SEM approach was employed to test the hypotheses with support SmartPLS 3.0. It is a suitable approach for examining a complicated model with many contemporary relationships (Tran & Nguyen, 2020). Before analyzing the data and testing the research hypotheses, we need to observe the descriptive statistics for our variables (Nyangarika, Mikhaylov, & Richter, 2019). Table 2 reports descriptive statistics of all measured items. The rule of thumb demonstrates that each outer loading should be larger or equal to the threshold of 0.7 (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014). To satisfy the threshold, the following items (PB9, PER5, OTC4 and OTC5) were eliminated due to low loadings. Table 2 reports the remaining outer loadings as being larger than 0.7, which satisfy the reliability of the scale. Cronbach's alpha and composite reliability (CR) values are greater 0.8 and in the good range (Hair et al., 2014). Table 2 also shows that average variance extracted (AVE) values are greater than 0.5, which meet the requirement for assessing convergent validity.

Table 2. Reliability and convergent validity

Variables	Mean	SD	Factor Loading	Alpha	Rho_A	CR	AVE
Thresholds				≥ 0.6	≥ 0.7	≥ 0.7	≥ 0.5
Environmental saving intention (ESI)				0.894	0.900	0.927	0.761
ESI1	4.050	0.839	0.890				
ESI2	4.155	0.741	0.923				
ESI3	4.122	0.699	0.896				
ESI4	4.161	0.723	0.773				
Proactive behavior (PB)				0.909	0.910	0.926	0.611
Individual task proactivity							
PB1	3.818	0.791	0.917				
PB2	3.729	0.976	0.911				
PB3	3.642	0.743	0.875				
Team member proactivity							
PB4	3.794	0.770	0.772				
PB5	3.824	0.868	0.864				
PB6	3.627	0.871	0863				
Organization member proactivity							
PB7	3.607	0.911	0.935				
PB8	3.738	0.868	0.926				
Openness toward change (OTC)				0.873	0.873	0.922	0.798
OTC1	4.023	0.936	0.906				
OTC2	3.946	0.922	0.914				
OTC3	3.720	0.917	0.858				
Perceived environmental responsibility (PER)				0.888	0.892	0.922	0.747
PER1	3.616	0.932	0.853				
PER2	3.705	0.904	0.870				
PER3	3.782	0.963	0.858				
PER4	3.821	0.812	0.876				
Social pressure (SP)				0.893	0.897	0.926	0.757
SP1	4.440	0.692	0.854				
SP2	4.404	0.680	0.887				
SP3	4.458	0.676	0.846				
SP4	4.333	0.730	0.892				

Top management support (TMS)				*0.904*	*0.906*	*0.933*	*0.778*
TMS1	3.919	0.918	0.889				
TMS2	3.869	0.908	0.923				
TMS3	3.994	0.933	0.875				
TMS4	4.110	0.875	0.839				

Discriminant validity is confirmed when the square root of the AVE values should exceed the correlation between two particular constructs (Fornell & Larcker, 1981). The findings on Table 3 satisfy this recommendation. In addition, Table 4 presents Heterotrait-Monotrait ratios, which are below 0.85 (Clark & Watson, 1995). Hence, the two different assessments affirm the scale of the model to assure the discriminant validity (Tran & Nguyen, 2020).

Table 3. Discriminant validity (Formell and Lacker)

	Formell and Lacker's Criterion					
	ESI	**OTC**	**PB**	**PER**	**SP**	**TMS**
Environmental saving intention (ESI)	*0.872*					
Openness toward change (OTC)	0.354	*0.893*				
Proactive behavior (PB)	0.397	0.379	*0.782*			
Perceived environmental responsibility (PER)	0.299	0.227	0.615	*0.864*		
Social pressure (SP)	0.600	0.456	0.378	0.296	*0.870*	
Top management support (TMS)	0.456	0.613	0.396	0.212	0.480	*0.882*

Notes: the square root of AVE on the diagonal.

Table 4. Discriminant validity (Heterotrait–Monotrait ratios of correlations).

	ESI	**OTC**	**PB**	**PER**	**SP**	**TMS**
Environmental saving intention (ESI)	*Criteria ≤ 0.85*					
Openness toward change (OTC)	0.404					
Proactive behavior (PB)	0.443	0.425				
Perceived environmental responsibility (PER)	0.338	0.258	0.681			
Social pressure (SP)	0.667	0.516	0.415	0.326		
Top management support (TMS)	0.505	0.689	0.435	0.235	0.532	

4.3. Structural model assessment

Analytical results of the PLS-SEM are implemented step by step according to the guidelines of (Hair, Hult, Ringle, and Sarstedt, 2016). The R-square values of two constructs (openness toward change and top management support) are 0.376 and 0.230, respectively. Those of proactive behavior and energy saving intention are 0.463 and 0.418, respectively. Moreover, the f-square indicators are larger than zero. Hence, these testing results satisfy the requirement for the model's predictive power in terms of forecasting outside the sample (Hair et al., 2016; Hair, Ringle, and Sarstedt, 2012). Figure 3 presents the path estimated coefficients in brackets.
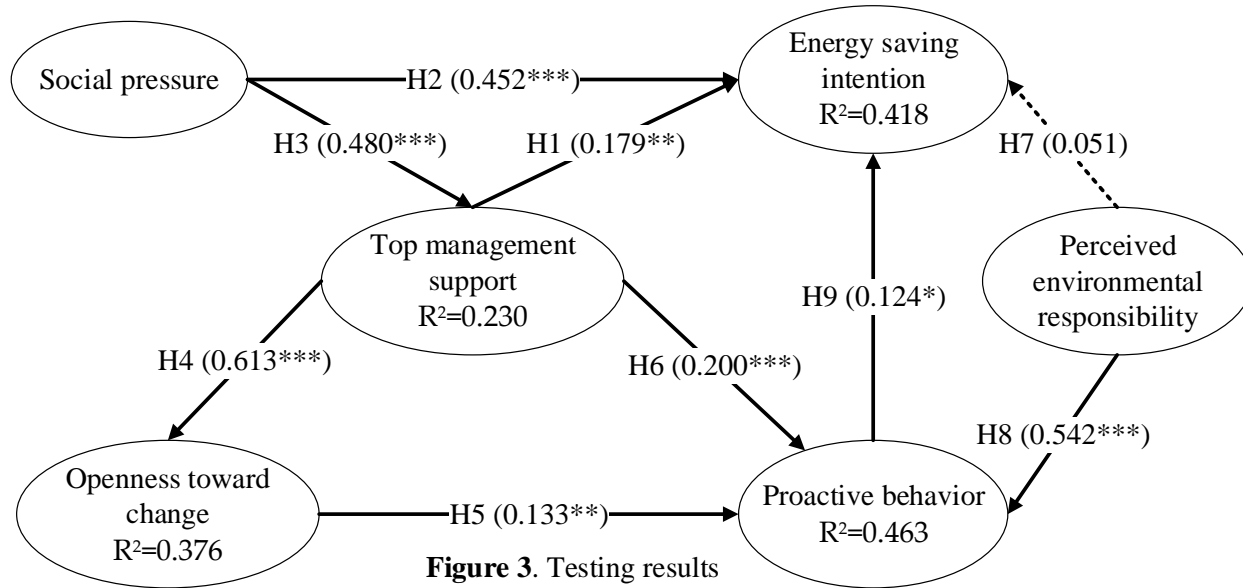
Figure 3. Testing results
(*p<0.1, **p<0.05, ***p<0.001)

Table 5 reports the path estimated coefficients and respective p-values, and significant level. All the hypotheses are supported with a statistical significance, except for H7. The testing results indicated that top management support had the strongest influence on openness toward change ($\beta = 0.613$, p<0.001), thus supporting H4. The paths from social pressure to energy saving intention ($\beta = 0.452$, p<0.001), and top management support ($\beta = 0.480$, p<0.001) were positive and significant, hence confirming H2 and H3. Top management support was positively related to both energy saving intention ($\beta = 0.179$, p<0.05) and proactive behavior ($\beta = 0.200$, p<0.001), thus supporting H1 and H6. Openness toward change was positive related to proactive behavior ($\beta = 0.133$, p<0.05), thus confirming H5. Proactive behavior has a positive impact on energy saving intention ($\beta = 0.124$, p<0.1), thus supporting H9. Finally, perceived environmental responsibility was positively related to proactive behavior ($\beta = 0.542$, p<0.001), but not energy saving intention ($\beta = 0.051$, p=0.340), thus confirming H8, but not H7.

Table 5. Estimated results

Hypothesis		Beta	P-value		Result
H1.	TMS → ESI	0.179	0.002	**	Supported
H2.	SP → ESI	0.452	0.000	***	Supported
H3.	SP → TMS	0.480	0.000	***	Supported
H4.	TMS → OTC	0.613	0.000	***	Supported
H5.	OTC → PB	0.133	0.033	**	Supported
H6.	TMS → PB	0.200	0.001	***	Supported
H7.	PER → ESI	0.051	0.340	n.s.	Not Supported
H8.	PER → PB	0.542	0.000	***	Supported
H9.	TMS->ESB	0.124	0.060	*	Supported

Notes: *p<0.05; **p<0.01; ***p<0.001; n.s. = non-significance.

5. Discussions and implications

We developed and validated the research model based on the integration of two referenced theories including the social information processing theory, and TPB. The respondents are managers of SMEs in Vietnam. With eight out of the nine suggested hypotheses supported, the findings disclose the following results. The research model, integrated and extended in two theories, can explain an essential circumstance of the reasons why managers intend to save energy at workplaces. First, TPB was extended to explain and predict manager's energy conservation intention and social pressure (extended from subjective norm). The developed hypothesis to capture the impact of social pressure on energy saving intention is supported. This result is in line with prior studies that social pressure, considered as an essential determinant, has a significant influence on energy saving intention of residents (Liu et al., 2020; Wang et al., 2018; Yue et al., 2013); and employees (Scherbaum et al., 2008; Tang et al., 2019). The TPB was also extended by considering perceived environmental responsibility as the predictors of energy-saving intention at workplace. The findings showed that perceived environmental responsibility had no direct effect on energy saving intention; but it had an indirect impact on energy saving intention through proactive behavior. The results were not line with previous studies (Botetzagias et al., 2015; Hua & Wang, 2019; Lizin et al., 2017; Ru et al., 2018).

Second, the social information processing theory was used to examine the relationship between proactive behavior with both openness toward change and top management support. The findings revealed how managers dealt with the challenges from internal factor such as top management support and exogeneous organizational factor such as openness toward change. However, how managers utilize such substantial factors for saving energy at workplaces remains unknown. The findings showed that manager's proactive behavior was positively associated with energy saving intention. Moreover, top management support had a significantly direct effect and indirect effect on proactive behavior through openness toward change. In turn, openness toward change was positively associated with proactive behavior. This result is in line with the previous finding (Bao et al., 2019). These finding extend our understanding of how managers respond to energy saving intention.

Finally, in the extension of previous behavior literature, we found that top management support played a central role in connecting key factors such as social pressure, openness toward change, proactive behavior, and energy saving intention in the integrated research model. Particularly, the support from top managers not only stimulates middle managers to pursue energy saving actions, but also encourage their ability to transfer positive attitude and openness toward change into proactive behavior. The findings are partially consistent with previous studies on top managers' role in accompanying middle managers' attitude toward environmental responsibility (Bao et al., 2019; Chin, Rowley, Redding, & Wang, 2018).

5.1. Theoretical implications

This paper offers some crucial theoretical implications. First, research on managers' energy saving intention in SMEs retains relatively new and has not been concerned in the prior studies. Previous studies on energy saving phenomenon have concentrated mainly on rational factors (e.g. attitude) of consumers (Gadenne et al., 2011; Hua & Wang, 2019); residents (Liu et al., 2020; Wang et al., 2018; Yue et al., 2013); employees (Scherbaum et al., 2008; Tang et al., 2019; Zhang et al., 2014). Most of these mentioned studies applied TPB theory to develop the research hypotheses. In addition, in the recent research, Bao et al. (2019) applied the social information processing theory to build the research model to evaluate middle managers' proactive behavior in responding environmental regulation, but not energy saving intention. Ours is among the first studies to integrate and extend both theories of TPB and social information processing to examine managers' responses to energy saving intention at workplaces.
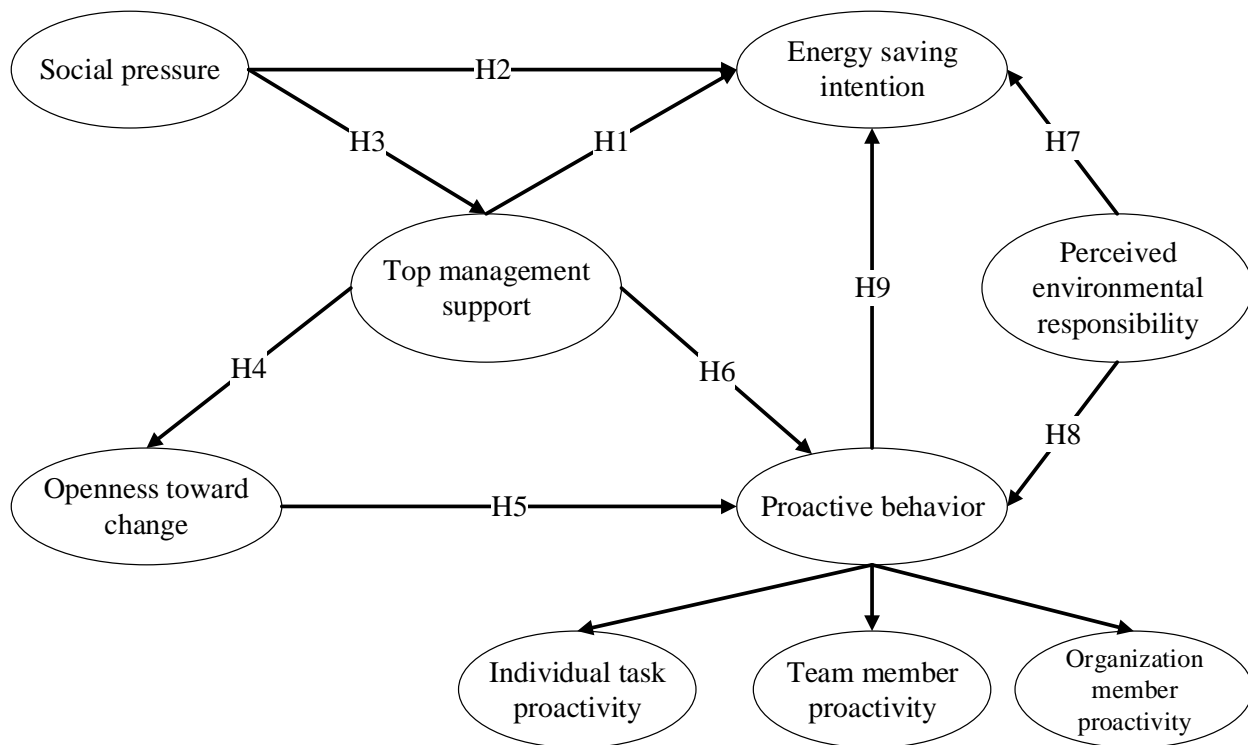
Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

5.2. Policy implications

The results provided some valuable recommendations for practitioners. First, the findings confirm that top management support play a fundamental role in SMEs' saving energy. Accordingly, company leaders should create incentive policies to motivate middle managers to implement energy saving behavior at workplaces. In addition, company leaders should attempt to generate a working environment where everyone is willing to change and has the autonomy to implement proactive behaviors. In other words, managers can share and receive innovative ideas or suggestions to improve the production process with energy efficiency. Second, our results of indirect impact of perceived environmental responsibility on energy saving through proactive behavior also indicate that perceived responsibility stimulates managers to be more proactive in energy-saving actions and evaluates whether their enterprises are ready for pursuing sustainable development. Therefore, company leaders should encourage to widespread propaganda of energy-saving behavior throughout training programs to enhance workers to use energy efficiency. Furthermore, top and middle managers should be more proactive in creating the sustainable business strategy.

6. Conclusions

This study shed a new light on managers' energy-saving intention in SMEs. The results enable us to add some theoretical and managerial contributions. We integrated and extended both theories of TPB and the social information processing into developing the research model. The empirical findings confirmed the key role of top management support in stimulating energy saving consumption at workplaces. Under the social pressure, managers are willing to change and stimulate subordinates to reduce energy consumption. They should enhance awareness of environmental responsibility at workplaces to gain the sustainable business development. The more openness toward change, managers are more proactive to seek for innovative ideas and suggestions to use energy efficiency at workplaces. To sum up, this study provides a better understanding of SMEs' energy-saving intention.

Limitations

Notwithstanding the current study reveals several implications, there are remarkable limitations, which should be investigated in future studies. First, SMEs participated are mainly located in HCMC, Vietnam. Therefore, caution must be taken when generating findings to other regions in Vietnam, other countries and larger corporations due to different cultural and social atmospheres. Second, it is better to extend the research model with external effects such as incentive policies for company investment in new technologies to protect environment. Considering in the external effects, future research can explore different interactions among determinants in the energy saving phenomenon.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Al-Shemmeri, T., & Naylor, L. (2017). Energy saving in UK FE colleges: The relative importance of the socio-economic groups and environmental attitudes of employees. *Renewable and Sustainable Energy Reviews*, *68*, 1130–1143. https://doi.org/10.1016/j.rser.2016.08.004

Bao, H., Wang, H., & Sun, C. (2019). How and when environmental regulation induces middle managers' proactive behavior. *Career Development International*, *24*(5), 438–452. https://doi.org/10.1108/CDI-06-2018-0168

Becherer, R. C., & Maurer, J. G. (1999). The proactive personality disposition and entrepreneurial behavior among small company presidents. *Journal of Small Business Management*, *37*(1), 28–36.

Bissing-Olson, M. J., Iyer, A., Fielding, K. S., & Zacher, H. (2013). Relationships between daily affect and pro-environmental behavior at work: the moderating role of pro-environmental attitude. *Journal of Organizational Behavior*, *34*(2), 156–175.

Blass, V., Corbett, C.J., Delmas, M.A., Muthulingam, S. (2014). Top management and the adoption of energy efficiency practices: evidence from small and medium-sized manufacturing firms in the US. *Energy*, *65*, 560–571. https://doi.org/10.1016/j.energy.2013.11.030

Botetzagias, I., Dima, A. F., & Malesios, C. (2015). Extending the Theory of Planned Behavior in the context of recycling: The role of moral norms and of demographic predictors. *Resources, Conservation and Recycling*, *95*, 58–67. https://doi.org/10.1016/j.resconrec.2014.12.004

Burke, P. J., & Csereklyei, Z. (2016). Understanding the energy-GDP elasticity: A sectoral approach. *Energy Economics*, *58*, 199–210. https://doi.org/10.1016/j.eneco.2016.07.004

Chin, T., Rowley, C., Redding, G., & Wang, S. (2018). Chinese strategic thinking on competitive conflict: insights from Yin-Yang harmony cognition. *International Journal of Conflict Management*, *29*(5), 683–704. https://doi.org/10.1108/IJCMA-09-2017-0101

Chitnis, M., Sorrell, S., Druckman, A., Firth, S. K., & Jackson, T. (2013). Turning lights into flights: Estimating direct and indirect rebound effects for UK households. *Energy Policy*, *55*, 234–250. https://doi.org/10.1016/j.enpol.2012.12.008

Clark, L. A., & Watson, D. (1995). Constructing Validity : Basic Issues in Objective Scale Development The Centrality of Psychological Measurement. *Psychological Assessment*, *7*(3), 309–319. https://doi.org/10.1037/1040-3590.7.3.309

Crant, J. M. (1995). The Proactive Personality Scale and Objective Job Performance Among Real Estate Agents. *Journal of Applied Psychology*, *80*(4), 532–537. https://doi.org/10.1037/0021-9010.80.4.532

Crant, J. M. (2000). Proactive behavior in organizations. *Journal of Management*, *26*(3), 435–462. https://doi.org/10.1177/014920630002600304

Cristea, M., Paran, F., & Delhomme, P. (2013). Extending the theory of planned behavior: The role of behavioral options and additional factors in predicting speed behavior. *Transportation Research Part F: Traffic Psychology and Behaviour*, *21*, 122–132. https://doi.org/10.1016/j.trf.2013.09.009

Dai, J., Montabon, F. L., & Cantor, D. E. (2014). Linking rival and stakeholder pressure to green supply management: Mediating role of top management support. *Transportation Research Part E: Logistics and Transportation Review*, *71*, 173–187. https://doi.org/10.1016/j.tre.2014.09.002

Ding, Z., Wang, G., Liu, Z., & Long, R. (2017). Research on differences in the factors influencing the energy-saving behavior of urban and rural residents in China–A case study of Jiangsu Province. *Energy Policy*, *100*, 252–259. https://doi.org/10.1016/j.enpol.2016.10.013

Escrig-Tena, A. B., Segarra-Ciprés, M., García-Juan, B., & Beltrán-Martín, I. (2018). The impact of hard and soft quality management and proactive behaviour in determining innovation performance. *International Journal of Production Economics*, *200*, 1–14. https://doi.org/10.1016/j.ijpe.2018.03.011

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurements error. *Journal of Marketing Research*, *18*(4), 39–50. https://doi.org/10.2307/3151312

Forward, S. E. (2009). The theory of planned behaviour: The role of descriptive norms and past behaviour in the prediction of drivers' intentions to violate. *Transportation Research Part F: Traffic Psychology and Behaviour*, *12*(3), 198–207. https://doi.org/10.1016/j.trf.2008.12.002

Frederiks, E. R., Stenner, K., & Hobman, E. V. (2015). The socio-demographic and psychological predictors of residential energy consumption: A comprehensive review. *Energies*, *8*(1), 573–609. https://doi.org/10.3390/en8010573

Gadenne, D., Sharma, B., Kerr, D., & Smith, T. (2011). The influence of consumers' environmental beliefs and attitudes on energy saving behaviours. *Energy Policy*, *39*, 7684–7694. https://doi.org/10.1016/j.enpol.2011.09.002

Gao, L., Wang, S., Li, J., & Li, H. (2017). Application of the extended theory of planned behavior to understand individual's energy saving

behavior in workplaces. *Resources, Conservation and Recycling*, *127*, 107–113.

Grant, A. M., & Ashford, S. J. (2008). The dynamics of proactivity at work. *Research in Organizational Behavior*, *28*, 3–34. https://doi.org/10.1016/j.riob.2008.04.002

Griffin, M. A., Neal, A., & Parker, S. K. (2007). A new model of work role performance: Positive behavior in uncertain and interdependent contexts. *Academy of Management Journal*, *50*(2), 327–347. https://doi.org/10.5465/AMJ.2007.24634438

Griffin, M. A., Parker, S. K., & Mason, C. M. (2010). Leader Vision and the Development of Adaptive and Proactive Performance: A Longitudinal Study. *Journal of Applied Psychology*, *95*(1), 174–182. https://doi.org/10.1037/a0017263

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2012). Partial Least Squares: The Better Approach to Structural Equation Modeling? *Long Range Planning*, *45*(5–6), 312–319. https://doi.org/10.1016/j.lrp.2012.09.011

Hair Jr, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2016). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications.

Hair Jr, J., Sarstedt, M., Hopkins, L., & G. Kuppelwieser, V. (2014). Partial least squares structural equation modeling (PLS-SEM) An emerging tool in business research. *European Business Review*, *26*(2), 106–121. https://doi.org/10.1108/EBR-10-2013-0128

Hua, L., & Wang, S. (2019). Antecedents of consumers' intention to purchase energy-efficient appliances: An empirical study based on the technology acceptance model and theory of planned behavior. *Sustainability (Switzerland)*, *11*(10), 4–17. https://doi.org/10.3390/su11102994

Jacobson, R. (1992). The "Austrian" School of Strategy. *Academy of Management Review*, *17*(4), 782–807. https://doi.org/10.5465/amr.1992.4279070

Jahanshahi, A. A., & Brem, A. (2017). Sustainability in SMEs: Top management teams behavioral integration as source of innovativeness. *Sustainability (Switzerland)*, *9*(10), 1–16. https://doi.org/10.3390/su9101899

Kaiser, F. G., & Gutscher, H. (2003). The proposition of a general version of the theory of planned behavior: Predicting ecological behavior. *Journal of Applied Social Psychology*, *33*(3), 586–603. https://doi.org/10.1111/j.1559-1816.2003.tb01914.x

Kickul, J., & Gundry, L. (2002). Prospecting for Strategic Advantage: The Proactive Entrepreneurial Personality and Small Firm Innovation. *Journal of Small Business Management*, *40*(2), 85–97. https://doi.org/10.1111/1540-627x.00042

Le, P. V. (2019). Energy demand and factor substitution in Vietnam: evidence from two recent enterprise surveys. *Journal of Economic Structures*, *8*(1), 1–17. https://doi.org/10.1186/s40008-019-0168-9

Lee, K. (2009). Gender differences in Hong Kong adolescent consumers' green purchasing behavior. *Journal of Consumer Marketing*, *26*(2), 87–96.

Leygue, C., Ferguson, E., & Spence, A. (2017). Saving energy in the workplace: Why, and for whom? *Journal of Environmental Psychology*, *53*, 50–62. https://doi.org/10.1016/j.jenvp.2017.06.006

Li, D., Xu, X., Chen, C. fei, & Menassa, C. (2019). Understanding energy-saving behaviors in the American workplace: A unified theory of motivation, opportunity, and ability. *Energy Research and Social Science*, *51*, 198–209. https://doi.org/10.1016/j.erss.2019.01.020

Liu, X., Wang, Q., Wei, H. H., Chi, H. L., Ma, Y., & Jian, I. Y. (2020). Psychological and demographic factors affecting household energy-saving intentions: A TPB-based study in northwest China. *Sustainability (Switzerland)*, *12*(3), 1–20. https://doi.org/10.3390/su12030836

Lizin, S., Van Dael, M., & Van Passel, S. (2017). Battery pack recycling: Behaviour change interventions derived from an integrative theory of planned behaviour study. *Resources, Conservation and Recycling*, *122*, 66–82. https://doi.org/10.1016/j.resconrec.2017.02.003

Maden, C. (2015). Linking high involvement human resource practices to employee proactivity: The role of work engagement and learning goal orientation. *Personnel Review*, *44*(5), 720–738. https://doi.org/10.1108/PR-01-2014-0030

Miller, Vernon D., Johnson, John R., Grau, J. (1994). Antecedents to Willingness to Participate in a Planned Organizational Chang...: EBSCOhost. *Journal of Applied Communication Research*, *22*(1), 59–80.

Nyangarika, A., Mikhaylov, A., & Richter, U. H. (2019). Oil price factors: Forecasting on the base of modified auto-regressive integrated moving average model. *International Journal of Energy Economics and Policy*, *9*(1), 149–159. https://doi.org/10.32479/ijeep.6812

Park, E., & Kwon, S. J. (2017). What motivations drive sustainable energy-saving behavior?: An examination in South Korea. *Renewable and Sustainable Energy Reviews*, *79*, 494–502.

Parker, S. K., Williams, H. M., & Turner, N. (2006). Modeling the antecedents of proactive behavior at work. *Journal of Applied Psychology*, *91*(3), 636–652. https://doi.org/10.1037/0021-9010.91.3.636

Rai, V., & Beck, A. L. (2015). Public perceptions and information gaps in solar energy in Texas. *Environmental Research Letters*, *10*(7), 1–9. https://doi.org/10.1088/1748-9326/10/7/074011

Rice, G. (2006). Pro-environmental behavior in Egypt: Is there a role for Islamic environmental ethics? *Journal of Business Ethics*, *65*(4), 373–390. https://doi.org/10.1007/s10551-006-0010-9

Ru, X., Wang, S., & Yan, S. (2018). Exploring the effects of normative factors and perceived behavioral control on individual's energy-saving intention: An empirical study in eastern China. *Resources, Conservation and Recycling*, *134*, 91–99. https://doi.org/10.1016/j.resconrec.2018.03.001

Scherbaum, C. A., Popovich, P. M., & Finlinson, S. (2008). Exploring individual-level factors related to employee energy-conservation behaviors at work. *Journal of Applied Social Psychology*, *38*(3), 818–835. https://doi.org/10.1111/j.1559-1816.2007.00328.x

Seibert, S. E., Kraimer, M. L., & Crant, J. M. (2001). What do proactive people do? A longitudinal model linking proactive personality and career success. *Personnel Psychology*, *54*(4), 845–874. https://doi.org/10.1111/j.1744-6570.2001.tb00234.x

Tan, C. S., Ooi, H. Y., & Goh, Y. N. (2017). A moral extension of the theory of planned behavior to predict consumers' purchase intention for energy-efficient household appliances in Malaysia. *Energy Policy*, *107*, 459–471. https://doi.org/10.1016/j.enpol.2017.05.027

Tang, Z., Warkentin, M., & Wu, L. (2019). Understanding employees' energy saving behavior from the perspective of stimulus-organism-responses. *Resources, Conservation and Recycling*, *140*, 216–223. https://doi.org/10.1016/j.resconrec.2018.09.030

Tran, K. T., & Nguyen, P. V. (2020). Corporate social responsibility: Findings from the vietnamese paint industry. *Sustainability (Switzerland)*, *12*(3), 1–20. https://doi.org/10.3390/su12031044

Wang, L., Wei, F., & Zhang, X. (2019). Why Does Energy-Saving Behavior Rise and Fall? A Study on Consumer Face Consciousness in the Chinese Context. *Journal of Business Ethics*, *160*(2), 499–513. https://doi.org/10.1007/s10551-018-3944-9

Wang, S., Lin, S., & Li, J. (2018). Exploring the effects of non-cognitive and emotional factors on household electricity saving behavior. *Energy Policy*, *115*, 171–180. https://doi.org/10.1016/j.enpol.2018.01.012

Wang, Z., Zhang, B., & Li, G. (2014). Determinants of energy-saving behavioral intention among residents in Beijing: Extending the theory of planned behavior. *Journal of Renewable and Sustainable Energy*, *6*(5), 053127. https://doi.org/10.1063/1.4898363

World Bank. (2019). Energy intensity level of primary energy. Retrieved from https://databank.worldbank.org/reports.aspx?source=2&series=EG.EGY.PRIM.PP.KD

Yang, S., Zhang, Y., & Zhao, D. (2016). Who exhibits more energy-saving behavior in direct and indirect ways in china? The role of psychological factors and socio-demographics. *Energy Policy*, *93*, 196–205. https://doi.org/10.1016/j.enpol.2016.02.018

Yue, T., Long, R., & Chen, H. (2013). Factors influencing energy-saving behavior of urban households in jiangsu province. *Energy Policy*, *62*, 665–675. https://doi.org/10.1016/j.enpol.2013.07.051

Zhang, B., Wang, Z., & Lai, K. hung. (2015). Mediating effect of managers' environmental concern: Bridge between external pressures and firms' practices of energy conservation in China. *Journal of Environmental Psychology*, *43*, 203–215. https://doi.org/10.1016/j.jenvp.2015.07.002

Zhang, Y., Wang, Z., & Zhou, G. (2014). Determinants of employee electricity saving: The role of social benefits, personal benefits and organizational electricity saving climate. *Journal of Cleaner Production*, *66*, 280–287. https://doi.org/10.1016/j.jclepro.2013.10.021

Zhang, Y., Wei, Y., & Zhou, G. (2018). Promoting firms' energy-saving behavior: The role of institutional pressures, top management support and financial slack. *Energy Policy*, *115*(January), 230–238.

Appendix A.

Table A1. Measure scale

Variables		Code	Items	Adapted and modified from previous studies
Social pressure		SP1	Most people who are important to me think I should save energy.	(Tang et al., 2019; Zhang et al., 2014)
		SP2	My director expects me to save energy.	
		SP3	My colleagues expect me to save energy.	
		SP4	I feel pressured due to the energy-saving activities of my colleagues	
Proactive behavior	Individual task proactivity	PB1	Initiated better ways of doing my core tasks	(Bao et al., 2019; Griffin et al., 2007)
		PB2	Come up with ideas to improve the way in which my core tasks are done	
		PB3	Made changes to the way your core tasks are done	
	Team member proactivity	PB4	Suggested ways to make my work unit more effective	
		PB5	Developed new and improved methods to help my work unit perform better	
		PB6	Improved the way my work unit does things	
	Organization member proactivity	PB7	Made suggestions to improve the overall effectiveness of the organization (e.g., by suggesting changes to administrative procedures)	
		PB8	Involved myself in changes that are helping to improve the overall effectiveness of the organization	
		PB9	Come up with ways of increasing efficiency within the organization	
Top management support		TMS1	Top management team in my organization is committing to implement environmental protection	(S. Wang et al., 2018)
		TMS2	The implementation of environmental protection can receive full support from my top management team	
		TMS3	Top management team can provide adequate resources to support the implementation of environmental protection	
		TMS4	Top management team consistently assesses the business impact on the environment by implementing environmental protection	
Perceived environmental responsibility		PER1	It is essential to promote environmental responsibility at workplaces	(Lee, 2009; L. Wang et al., 2019)
		PER2	I strongly agree that more environmental protection works are needed	
		PER3	I concern for environmental protection issues	
		PER4	I think environmental protection is meaningful	
		PER5	It is very important to raise environmental awareness at workplaces	
Openness toward change		OTC1	I would consider myself to be "open" to the changes the work teams will bring to my work role	(Bao et al., 2019; Miller et al., 1994)
		OTC2	Right now, I am somewhat easy to the proposed changes in work teams	

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

	OTC3	I am looking forward to the changes in my work role brought about by the implementation of work teams	
	OTC4	I think that the implementation of work teams will have a positive effect on how I accomplish my work.	
	OTC5	From my perspective, the proposed changes in the work teams will be for the better.	
Energy saving intention	ESI1	I am willing to save energy for my organization	(Gao et al., 2017; Park and Kwon, 2017; Tang et al., 2019)
	ESI2	I intend to engage in energy-saving activities in my organization	
	ESI3	I will make an effort to save energy in my organization	
	ESI4	I recommend others use energy-saving in my organization	

Source: Data collection

Phuong V. NGUYEN is currently an Associate Professor of Business Management at International University, Vietnam National University, Ho Chi Minh City. Before becoming a Lecturer, he had 11 years of working experience in Telecom Industry in Vietnam. He has participated in several consulting projects as the role of a financial manager, project leader, and strategic business advisor. Since working in the academic field, his research interests include the technology spillovers, international strategies, and innovation from foreign direction investment and behavioural studies on business management and public administration.
ORCID ID: orcid.org/0000-0002-2034-4471

Khoa T. TRAN is the Rector of International University, Vietnam National University, Ho Chi Minh City. He received his MBA in International Business at Asia Institution of Technology in Thailand in 1996. He completed his doctorate degree in Marketing and International Business at Western Sydney University, Australia in 2014. His research interests include educational management, brand development, international marketing, technology transfers and behavioural studies on business management and public management.
ORCID ID: orcid.org/0000-0002-4498-5871

ENTREPRENEURSHIP AND SUSTAINABILITY CENTER

Publisher

http://jssidoi.org/esc/home

enterprise europe network

Business Support on Your Doorstep

OASPA

Scopus

Web of Science

Clarivate Analytics

THE MEDIATING ROLE OF JOB SATISFACTION ON COMPENSATION, WORK ENVIRONMENT, AND EMPLOYEE PERFORMANCE: EVIDENCE FROM INDONESIA

Idris [1], Khofifatu Rohmah Adi [2], Budi Eko Soetjipto [3], Achmad Sani Supriyanto [4]

[1,2,3] Universitas Negeri Malang, Semarang Str. No. 5 Malang, Indonesia
[4] State Islamic University of Maulana Malik Ibrahim Malang, Gajayana Str. No. 50 Malang, Indonesia

E-mails: [1] idris.fis@um.ac.id; [2] khofifatu.rohmah.fis@um.ac.id; [3] budi.eko.fe@um.ac.id; [4] achmad_sani72@yahoo.com

Abstract. Job satisfaction has a pivotal role in improving employee performance. It provides enthusiasm and high motivation to employees to increase productivity. On the other hand, to improve employee performance, the organization provides compensation based on established standards and in an environment that is, sometimes, less conducive. This study purposes to examine the mediating role of job satisfaction on compensation, work environment, and employee performance at State Polytechnic colleges in Indonesia. This study used Partial Least Square (PLS) as data analysis. This study found that compensation has no impact on job satisfaction and employee performance. In addition, job satisfaction cannot mediate the compensation and employee performance. However, the work environment positively and significantly affects job satisfaction and employee performance. Job satisfaction has impact on work environment and employee performance. It also influences employee performance positively and significantly. Thus, job satisfaction directly or indirectly can be a mediator for the relationship between work environment and employee performance.

Keywords: Job Satisfaction, compensation, work environment, employee performance, and State Polytechnic colleges.

1. Introduction

Globalization has brought many challenges to organizations in managing employee performance to achieve organizational goals (Gorondutse & Hilman, 2019; Polychroniou & Trivellas, 2018). The success of an organization hang on the utilization of human resources such as people who provide energy, creativity, and enthusiasm for the organization and plays a pivotal role in the implementation of organizational operations (Ali Alsheikh, Ahmad Alremawi, & Bin A Tambi, 2018). Human resources must always be considered, maintained, and developed by organizations (Dessler, 2000; Hasibuan, 2002; Purwadita, Sudiro, Mugiono, & Idris, 2018; A.

Sani, Wekke, Ekowati, Abbas, & Idris, 2018; Achmad Sani, Ekowati, Wekke, & Idris, 2018). The performance of private employees is considered better than civil servants. Private employee performance standards tend to be more transparent and more measurable. By providing reward and punishment, recruitment, promotion, and mutation, private organizations are more open than civil servants. As a result, their performance and organizational performance at the same time are further improved. Furthermore, globalization has also pushed bureaucratic reform into a necessity and the high performance of Civil Servants has become a demand for public organizations, as a consequence of increasing their salaries.

In 2016, the Ministry of State Apparatus and Bureaucratic Reform of Indonesia released a survey on the Performance of Civil Servants. The survey found that only 40% of civil servants in Indonesia have certain skills and expertise at work. In addition, as many as 60% of the total 4,498,643 civil servants in Indonesia have only administrative expertise. Based on these findings, it was revealed that many civil servants were monotonous in their work and lack of innovation in carrying out their work. Therefore, improvements in employee recruitment in the future must be based on the skills and capabilities of candidates to occupy the required formation (Abnur, 2016). This of course also occurs in state polytechnics college as one of the government institutions in the field of education. Therefore, improving employee performance in this context is vital to be a concern.

Higher education is one of the service organizations that is dependent on Human Resources to achieve its goals. Its success depends greatly on the activities of the utilization of Human Resources. Employees who provide energy, creativity, and enthusiasm for the organization for the continuity of the operational functions of the organization need to manage Human Resources to improve employee performance as expected. However, organizational management often has difficulty in identifying the factors caused the decline in employee performance (Idris, 2019).

No organization can achieve its goals successfully through the hard work of one or a few individuals. In short, all employees must perform well to achieve the goals of the state polytechnic college. In fact, employee performance has many dimensions that must be considered by the institution because it affects the strategy and goals of the organization (Idris & Adi, 2019). Therefore, the overall performance of employees makes a significant contribution to the core of the organization. Productivity and efficiency are benchmarks of employee performance. This raises an understanding of the importance of the role of employees as organizational assets, the organization cannot achieve its goals without the participation of employees (Idris et al., 2020).

The concept of employee performance refers to the level and quality of effort, cooperation, commitment, tardiness and absence, as well as employee adherence to organizational standards. Similarly, employees who work to achieve certain jobs that lead to positive results and behavior. Employee performance is the achievement and contribution of individual workers that can be measured. It is a concept with complex aspects and is susceptible to the influence of several variables, which include age, gender, employee recognition and job satisfaction (Hambali & Idris, 2020; Supriyanto, Ekowati, Idris, & Iswanto, 2020).

For the sake of survival, employee in the state polytechnics college work to get money to meet all their needs. Thus, employees work hard and show loyalty to the organization. Compensation provided by the organization is an appreciation of employee work performance. It is a way for management in improving work performance, motivating and improving the performance of employees (Mathis & Jackson, 2000). Compensation has a significant impact on employee performance (Anderson, Pyo, & Zhu, 2018; Buachoom, 2017; Salisu, Chinyio, & Suresh, 2015). Mabaso and Dlamini (2017) found that compensation is a key factor that can affect employee satisfaction. However, in this study, benefits, as part of the compensation dimension, did not affect job

satisfaction. Industrial employees in Ethiopia are satisfied with the compensation payments they receive, which increases the performance of employees (Addis, Dvivedi, & Beshah, 2018). In addition, not only compensation satisfaction can have a broad impact on work behavior and quality of life of employees, but also financial benefits can be a critical factor for performance (Che Ahmat, Arendt, & Russell, 2019; Igalens & Roussel, 1999; Patiar & Wang, 2020; Syed, 2020).

CEOs of technology and non-technology companies in the USA, for example, suppressed compensation payments when the industrial cycle was declining, which was intended to motivate employees to improve their performance (Anderson et al., 2018). The dependency of the unit wage compensation scheme in Australia results in higher employee performance compared to the fixed payment bonus compensation scheme (Chong & Leung, 2018). In another study, some regulations have been issued by the Chinese government to control executive compensation of state-owned businesses, by setting the optimum level of managerial compensation with orientation to the average wage of employees. This is significant by increasing employee satisfaction which has an impact on employee performance in China (Jiang & Zhang, 2018). In addition, The importance of the Islamic work ethic applied in organizations provides intrinsic motivation and employee work attitudes such as organizational commitment and job satisfaction, thereby it can increase employee performance in the organization (Kataria, Garg, & Rastogi, 2019).

Compensation practices, workforce planning, and HR practices that focus on work or life balance can be used to estimate job satisfaction and can increase reductions in turnover intentions (Martinson & De Leon, 2018). In contrast, a study in Kenya showed teachers felt very unhappy with all aspects of the compensation received financially or non-financially. However, the basic salary, benefits and work environment greatly affect teacher job satisfaction (Muguongo, Muguna, & Muriiti, 2015). Also, sale satisfaction has no a positive impact on employee performance in insurance companies (El Samen & Akroush, 2018). Thus, this study is intended to fill the gap of findings in the previous research.

Organizations face several tasks due to the dynamic landscape of the environment. To deal with the environment and changes that are constantly changing and developing to be success and remain competitive, the organization needs to satisfy its employees by meeting the needs of employees and providing good working conditions (Amabile, Conti, Coon, Lazenby, & Herron, 1996; Amiroso & Mulyanto, 2015). Empirical studies have illustrated that the environment plays a pivotal role in improving performance. Educational institutions, banking and the telecommunications industry in Pakistan prove that work environment and job satisfaction correlated positively. Managers recognize the standing of a good work environment to optimize the high of job satisfaction (Raziq & Maulabakhsh, 2015). Jain and Kaur (2014), and Muguongo, et al. (2015) found a significant relationship between work environment and satisfaction. However, work environment that is not conducive in banking industry in India proves a negative impact on employee satisfaction (Dhamija, Gupta, & Bag, 2019). Also, Amiroso and Mulyanto (2015) found that the work environment did not affect the employee performance. The difference in these findings provides further opportunities in further research to confirm the gap. Therefore, this study is intended to examine the link of compensation, work environment, job satisfaction, and employee performance.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

2. Literature review

2.1 Compensation, job satisfaction, and employee performance

Compensation is everything that employees receive as compensation for their work (Handoko, 2006). Compensation is also considered as any form of compensation given by the company to its employees for the sacrifice of the employee concerned (Soehardi, 2003). The sacrifice of these employees can be in the form of work, performance services, costs, or the effort spent to achieve certain goals set by the company. Meanwhile, Simamora (2006) argues that compensation is also all forms of financial returns, tangible services, and benefits received by employees as a portion of an employment relationship.

In awarding compensation, what should be noted is that compensation must be appropriate, fair, acceptable, satisfying, motivating for work, rewarding, and based on needs. Giving compensation will provide benefits to both parties, both to the company and to the employees (Sopiah, 2013). This is due to job satisfaction can affect happiness, morale, and employee motivation in increasing productivity (Mabaso & Dlamini, 2017; Zhang, Cai, Jia, & Li, 2018)

Empirical evidence that proves the relationship of compensation, satisfaction, and performance is proven by several previous studies. Compensation positively affect employee performance (Anderson et al., 2018; Buachoom, 2017; Salisu et al., 2015). Industrial employees in Ethiopia are satisfied with the compensation payments they receive so as to improve the employees performance (Addis et al., 2018). An increase in compensation give a positive impact on employee satisfaction which has an effect on increasing employee performance (Chong & Leung, 2018; Jiang & Zhang, 2018; Martinson & De Leon, 2018). The essential of the Islamic work ethic applied in organizations provides intrinsic motivation and employee work attitudes such as organizational commitment and satisfaction, thereby it can increase employee performance in the organization (Kataria et al., 2019). Based on the description, the hypothesis is proposed as follows.
Hypothesis 1: There is a significant effect between Compensation and Employee Performance.
Hypothesis 2: There is a significant effect between Compensation and Job Satisfaction.
Hypothesis 3: There is a significant effect between Compensation and Employee Performance through Job Satisfaction.

2.2 Work environment, job satisfaction, and employee performance

Work environment is somewhat that is in the workers setting and that impact their finishing tasks assigned (Nitisemito, 2001). The work environment is the entire tool kit, the close environment in which methods, works, and arrangements of a person both as individuals or as a group (Sedarmayanti, 2011). The work environment is also defined by noise, tools, materials, space, physical layout, and co-worker relationships as well as the quality of all of those that have essential impacts on the high quality of work (Raziq & Maulabakhsh, 2015).

Safe, comfortable and attractive working conditions are created if the environment around the workplace is healthy (Raziq & Maulabakhsh, 2015). Healthy work environment includes regulation of noise, workplace lighting, humidity and air temperature, service needs of employees, use of color, maintenance of environmental cleanliness and the provision of various facilities needed by employees, such as toilets, changing rooms, and places of worship (Amiroso & Mulyanto, 2015).

Some empirical evidence conducted by previous researchers proves that the effect of work environment, job satisfaction, and employee performance was significant. Educational institutions, banking and the telecommunications industry in Pakistan prove a significant effect of the work environment to employee job

satisfaction. Managers recognize the standing of a respectable work environment to exploit the level of job satisfaction (Raziq & Maulabakhsh, 2015). Jain and Kaur (2014), and Muguongo, et al. (2015) found a significant correlation between work environment and job satisfaction. The banking industry in India proves that the work environment make employee unhappy resulting in decreased employee performance (Dhamija et al., 2019).
Hypothesis 4: There is a significant effect between work environment and employee performance.
Hypothesis 5: There is a significant effect between work environment and job satisfaction.
Hypothesis 6: There is a significant effect between work environment and employee performance through job satisfaction.

2.3 Job satisfaction and employee performance

Job satisfaction is a significant aspect in the practice of organizational behavior and human resource management. Job satisfaction could affect happiness, morale, and employee motivation in increasing productivity (Mabaso & Dlamini, 2017). Job satisfaction is a close personal entity that can be felt by those concerned. Owusu (2014) states that job satisfaction is a feeling of preference or satisfaction with one's work or experience at work. This condition can lead employees to a condition where they can improve their performance level. Meanwhile, in different conditions, emotionally dissatisfied with work, can cause low performance of employees. On the other hand, high performance is very important for organizations to achieve what has been the goal.

Bernandin and Russel (1993) defines performance as a record of the results from the function of a particular job during a certain period. Meanwhile, according to Mangkunegara (2009) performance is the product of quality and quantity of work accomplished by an employee in finishing their tasks and related to their responsibilities to fulfil their duties on time. Performance is defined as the product reached by a person in finishing the tasks assigned based on their experience, skill, and sincerity. Performance is also a combination of three essential factors including the interest and ability of a worker, the ability and acceptance of the delegation's task explanation, and the role and level of worker motivation. The higher the three factors, the greater the person's performance (Hasibuan, 2002).

Previous research has shown a positive effect in job satisfaction and employee performance (Amiroso & Mulyanto, 2015; Chong & Leung, 2018; Dhamija et al., 2019; Jiang & Zhang, 2018; Kataria et al., 2019; Martinson & De Leon, 2018). To improve overall performance, managers target and focus on the welfare of their employees so as to encourage employees to work better. This is an effort to satisfy the workers (Shahzad, Farrukh, Kanwal, & Sakib, 2018). Thus, the hypothesis is proposed as follows.
Hypothesis 7: There is a significant effect between job satisfaction and employee performance.

Based on theoretical and empirical understanding, the conceptual framework is as follows (Figure 1).

Fig. 1. Conceptual Model

3. Research method

This research used an explanatory approach. The population of this study is fulltime and permanent employee at State Polytechnic colleges in East Java, Indonesia (Three Colleges). The questionnaire was distributed to 155 civil servants who had worked for more than one year. The data have been collected between April to July 2019 . The sample was determined by slovin formula as follow:

$$n = \frac{N}{1 + Ne^2}$$

$$n = \frac{253}{1 + 253 \times 0.05e^2}$$

$$n = \frac{253}{1 + 253 \times 0.0025}$$

$$n = \frac{253}{1 + 0.6325}$$

$$n = \frac{253}{1.6325}$$

$$n = 154.977$$

The demographic profile for respondents indicated by table 1 as follow.

Table 1. Demographic Profile for respondents ($n =155$)

Variables	Categories	%
Gender	Male	37
	Female	63
Age	<25	3
	26-30	52
	>30	45
Highest Education	Senior high school	10
	Bachelor	88
	Master	2
Working status	<3	18
	3-5	78
	>5	6

Source: Data processed (2019)

3.1 Measures

The definition of a variable and the process of determining the indicators or dimensions of each variable is an attempt to form indicators of a variable that has been described previously. Establishment of variable indicators to assist measurement techniques and facilitate observation in data collection. The following are the variables and their indicators (Table 2).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Table 2. Operational Variables

Variables	Indicators	Scales	Sources
Compensation (X1)	Salary		Odunlade (2012)
	Incentive		
	Allowance		
	Facilities		
Work environment (X2)	Physical		Jain and Kaur (2014)
	Non-Physical	5 Likert Scale	
Job Satisfaction (Z)	Work itself		Mabaso and Dlamini (2017)
	Cooperation		
	Promotion		
	Supervision		
Employee Performance (Y)	Work quantity		Jamil and Raja (2011)
	Work quality		

Source: Data processed (2019)

The questionnaire was developed and adapted from previous studies, compensation from Odunlade (2012), work environment from Jain and Kaur (2014), job satisfaction from Mmabaso and Dlamini (2017), and employee performance from Jamil and Raja (2011). This study used likert-type scale to measure each item for all variables ranging from 1 = strongly disagree to 5 = strongly agree. One sample item included "I am satisfied with the salary".

Partial least square (PLS) was used to analyzed the data--structural modeling with indicators that are reflective and formative (Ghozali, 2006). Measurement of each variable used indicators adopted from several theories that have been used by previous researchers as described in table 2.

4. Results and discussions

4.1 Measurement model
The first stage in PLS analysis is assessing the construct validity and reliability. It was measured by loading Factor value and Average variance extracted (AVE). An instrument meet the convergent validity by loading factor exceeding 0.6 (Ghozali, 2006) and AVE above 0.5 (Chin, 1995). The results are presented as follow (Table 3).

Table 3. The Convergent validity measured by loading factors

Variables	Indicators	Loading Factor	Cut off	Inf.
Compensation (X1)	X.1.1	0.742	0.6	Valid
	X.1.2	0.791	0.6	Valid
	X.1.3	0.818	0.6	Valid
	X.1.4	0.730	0.6	Valid
Work Environment (X2)	X.2.1	0.898	0.6	Valid
	X.2.2	0.907	0.6	Valid
Job Satisfaction (Z)	Z.1	0.809	0.6	Valid
	Z.2	0.806	0.6	Valid

	Z.3	0.807	0.6	Valid
	Z.4	0.810	0.6	Valid
Employee Performance (Y)	Y.1	0.692	0.6	Valid
	Y.2	0.910	0.6	Valid

Source: Data processed (2019)

Table 3 shows the loading factors exceed 0.6 ranging from 0.692 to 0.910, which indicate adequate validity from all variables. The loading factors values exceed the minimum criteria, which mean that all variables are valid. It can be assumed that the model could describe the relationship of all indicators with their latent variables. Compensation, work environment, job satisfaction, and employee performance are valid as it has fulfilled the criteria for measuring convergent validity > 0.6. Therefore, these indicators can measure the variables (Table 4).

Table 4. Average Variance Extracted (AVE)

Variables	AVE	Cut off	Keterangan
Compensation (X1)	0.514	0.5	Valid
Work environment (X2)	0.697	0.5	Valid
Job satisfaction (Z)	0.581	0.5	Valid
Employee performance (Y)	0.589	0.5	Valid

Source: Data processed (2019)

Table 4 indicates that all indicators are valid because the measurement results of the model meet the requirements, the value of AVE > 0.5, ranging from 0.514 to 0.697.

To test the validity measurement, factor analysis is used by using the result of cross loadings. The loadings factor are considered adaptable (0.55–0.62), very good (0.63–0.70), and excellent (above 0.71) (Ghozali, 2006). Discriminant validity was measured by examining the loadings to indicate that the value in the same construct correlates highly amongst themselves. Table 5 indicates that the bold values are higher than across the column. Thus, all items indicate that the loadings value higher than the acceptable level. The result is as follow (Table 5).

Table 5. The values of cross loading

Indikator	X1	X2	Y	Z
X1.1.1	**0.742**	0.021	0.078	0.113
X1.1.2	**0.527**	-0.005	0.008	-0.052
X1.2.1	**0.726**	0.084	0.147	0.152
X1.2.2	**0.791**	-0.022	0.122	0.074
X1.3.1	**0.753**	-0.096	0.109	0.041
X1.3.2	**0.818**	-0.068	0.091	0.118
X1.4.1	**0.73**	-0.163	0.058	0.062
X1.4.2	**0.605**	-0.153	0.054	0.05
X2.1.1	-0.061	**0.716**	0.134	0.246
X2.1.2	0.005	**0.898**	0.304	0.305
X2.2.1	-0.057	**0.907**	0.328	0.306
X2.2.2	-0.042	**0.804**	0.211	0.252
Y.1.1	0.027	0.047	**0.665**	0.393

Y.1.2	0.19	0.195	**0.692**	0.475
Y.2.1	0.15	0.184	**0.91**	0.737
Y.2.2	0.059	0.434	**0.777**	0.692
Z.1.1	0.059	0.434	0.777	**0.692**
Z.1.2	0.154	0.134	0.485	**0.809**
Z.2.1.	0.118	0.12	0.372	**0.806**
Z.2.2	0.122	0.104	0.347	**0.732**
Z.3.1	0.173	0.176	0.501	**0.807**
Z.3.2	0.109	0.127	0.375	**0.81**
Z.4.1	0.072	0.362	0.747	**0.751**
Z.4.2	0.079	0.258	0.661	**0.676**

Source: Data processed (2019)

Table 5 shows that overall, the loading factor value in the instrument is higher than the cross correlation on other variables. Thus, the instrument can be assumed to be able to measure latent variables.

The second stage is assessing the construct reliability by measuring the value of Alpha Cronbach (> 0.6), and Composite Reliability (0.7). the results are presented as follows (Table 6).

Table 6. The values of construct realiability

Variables	Alpha Cronbach	Cut off	Composite Reliability	Cut off	Inf.
Conpensation (X1)	0.874	0.7	0.893	0.7	Reliabel
Work Environment (X2)	0.856	0.7	0.901	0.7	Reliabel
Job Satisfaction (Z)	0.904	0.7	0.917	0.7	Reliabel
Employee performance (Y)	0.766	0.7	0.849	0.7	Reliabel

Source: Data processed (2019)

Table 6 shows that the Cronbach alpha value for all variables is greater than 0.7, compensation (0.874), work environment (0.856), job satisfaction (0.904), and employee performance (0.766). Meanwhile, for the composite reliability value of each variable are compensation (0.893), work environment (0.901), job satisfaction (0.917), and employee performance (0.849). The reliability composite value also exceeds 0.7. Thus, the instrument can be declared reliable.

4.2 Goodness of fit model
The next step is the measurement of the Goodness of fit model (GFM). GFM is used to validate that the endogenous variables can clarify the diversity of exogenous variables. To find out the contribution of exogenous variables to endogenous variables, here is based on the Q2 value (Q-square predictive relevance) as shown in the following table 7.

Table 7. The Goodness of Fit Model

Variables	R^2
Employee Performance	0.612
Job Satisfaction	0.135
$Q^2 = 1 – (1 – R1^2) \times (1 – R2^2)$	
$Q^2 = 1 – (1 – 0.612) \times (1 – 0.135)$	
$Q^2 = 1 – 0.335$	
$Q^2 = 0.665$	

Source: Data processed (2019)

The R2 value of the employee performance variable is 0.612 or 61.2%. This means that employee performance variables can be explained by compensation, work environment, and job satisfaction variables by 61.2%. Then, the contribution of other variables that were not a concern in this study was 38.8%. Meanwhile, the R2 value for the job satisfaction variable is 0.135 or 13.5% in percentage. This shows that the variable of job satisfaction can be described by the variable compensation, and the work environment by 13.5%. Meanwhile, the remaining 96.5% is contributed by other variables that not be covered by this study.

The diversity of employee performance variables that can be explained in this study model is seen from the Q2 (Q-Square Predictive Relevance) value of 0.665 or 66.5%. While the remaining 33.9% is contributed by other variables that are not a concern in this study. Thus, the exogenous variable contributes to endogenous variable is 66.5%.

4.3 Structural model

The next model being tested is the Structural Model. The value of each path coefficient is measured by bootstrapping with 5000 samples using the replacement method. Hypothesis testing is projected to test and find out whether there is an influence between variables developed in the model. This test refers to the T-statistic value, where if the T-statistic value exceeds the T-Table (1.96), the hypothesis is accepted. The results are presented in Figure 2 and table 8 as follows.
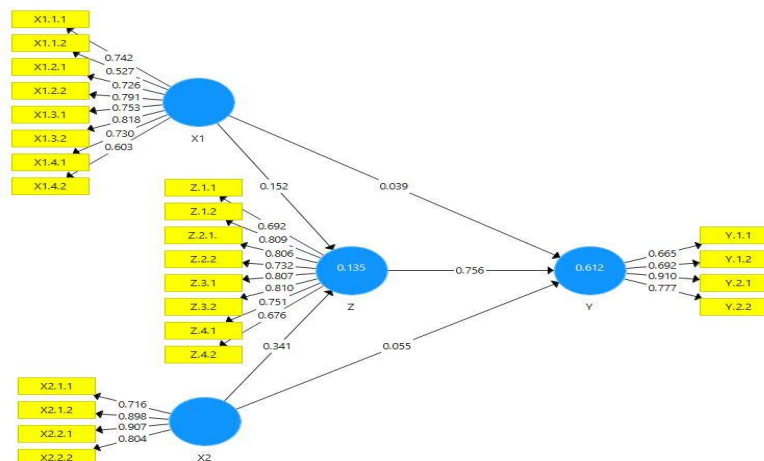
Fig. 2. Path Diagram
Source: Data processed (2019)

744

Tables 8. The result of hypotheses testing

Hypoteses	Effects	Coefficient	T-Statistic	Inf.
1	X1 → Y	0.039	1,571	Insignificance
2	X1 → Z	0.152	1.382	Insignificance
3	X2 → Y	0.055	5.501	Significance
4	X2 → Z	0.341	6.007	Significance
5	Z → Y	0.756	27.901	Significance
6	X1 → Z → Y	0.115	1.391	Insignificance
7	X2 → Z → Y	0.258	6.381	Significance

Source: Data processed (2019)

Figure 2 and Table 8, in general, show that compensation (X1) either directly or indirectly has no impact on job satisfaction (Z) and employee performance (Y). In contrast, work environment (X2) has a direct and indirect impact on job satisfaction (Z) and employee performance (Y). Furthermore, it indicates that Job satisfaction (Z) cannot mediate the compensation (X1) and employee performance (Y). However, it can mediate the correlation between work environment (X2) and employee performance (Y).

4.4 Compensation, job satisfaction, and employee performance

Figure 2 and Table 8 show that the coefficient of compensation for employee performance has a positive value of 0.039 and has a T-statistic of 1.571. This indicates compensation has a positive relationship, but does not significantly influence employee performance. This is because the T-statistic value is smaller than the T-table value, which is 1.571 <1.96. Thus, H1 is rejected.

This finding indicates that employees at the polytechnic college feel quite satisfied with the compensation given. This is indicated by the high respondents' assumptions about the incentives that have been made by polytechnic colleges. In addition, this finding also claims that the high compensation of employees in polytechnic colleges does not make employees have high performance. Thus, they assume that there are other factors that can be a major cause in improving employee performance, such as discipline, work culture, leadership and others.

Compensation positively related to job satisfaction (Coefficience = 0.152), but it is not significant with the variable Job Satisfaction (T-statistic = 1.382). The T-statistic value is smaller than the calculated T-ratio of 1.382 <1.96. Thus, H2 is rejected. Compensation provided by polytechnic colleges does not provide job satisfaction for employees. One reason is because employees consider compensation as an organizational obligation that must be given to employees. Hence, job satisfaction cannot be determined by the compensation given by the organization.

The job satisfaction (as a mediating variable between compensation and employee performance) has no significant effect. This is indicated by the results of the path coefficient of 0.115 and the value of T-Statistics of 1.391, the value of T-Statistics is smaller than the value of T-table. Therefore, the third hypothesis is rejected.

Compensation also includes all forms of tangible services, benefits received by employees as part of a work relationship, and financial returns (Simamora, 2006). Employee sacrifice can be in the form of work, performance services, costs, or the effort spent to achieve certain goals set by the company. Job satisfaction is one important aspect in the practice of organizational behavior and human resource management. This is because job satisfaction provides happiness, morale, and employee motivation in increasing productivity (Mabaso & Dlamini, 2017; Zhang et al., 2018).

The findings of this study are supported by research in Kenya that teachers feel very unhapppy with all aspects of financial and non-financial compensation received. However, the basic salary, benefits and work environment greatly affect teacher job satisfaction (Muguongo et al., 2015). Satisfaction of sales results also does not impact on employee performance in insurance companies (El Samen & Akroush, 2018). In addition, the financial benefits obtained as a company compensation lead to high employee satisfaction and high performance at other service companies such as hotels (Che Ahmat et al., 2019; Patiar & Wang, 2020).

This study proves findings that are a quite different from previous studies which prove the links of compensation, satisfaction, and performance. Compensation affects employee performance (Anderson et al., 2018; Buachoom, 2017; Salisu et al., 2015). In addition, Industrial employees in Ethiopia are satisfied with the compensation payments they receive, which increases the performance of employees (Addis et al., 2018). Increased compensation provides a significant effect on employee satisfaction which has an impact on increasing employee performance (Chong & Leung, 2018; Jiang & Zhang, 2018; Martinson & De Leon, 2018). The importance of the Islamic work ethic that is applied in organizations gives intrinsic motivation and employee work attitudes such as organizational commitment and satisfaction, thereby it could increase employee performance in the organization (Kataria et al., 2019).

4.5 Work environment, job satisfaction, and employee performance

Figure 2 and table 8 also describe the coefficient value of the work environment variable on employee performance of 0.055 with a positive value and has a T-statistic of 5.501. This shows that the link of work environment variables and employee performance is a positive and significant. Similarly, the path coefficient value of the work environment and job satisfaction of 0.341 and T-Statistics 6.007. Thus, the work environment and job satisfaction is positively and significantly correlated. Both have T-Statistics values greater than T-statistics with 5.501> 1.96, and 6.007> 1.96. With regard to the results of testing this hypothesis, it shows that the better working environment will improve employee performance and increase employee job satisfaction. Therefore, hypothesis 4 and hypothesis 6 in this study were accepted.

Job Satisfaction as a mediating variable is also significant. This is indicated by the results of the path coefficient of 0.258 and the T-Statistics value of 6.381. The T-Statistics value is smaller than the T-table value. This means that job satisfaction for employees in polytechnic colleges positively and significantly affect work environment and employee performance.

This finding supports several previous studies related to the link of work environment, job satisfaction, and employee performance. Previous research has shown that the correlation among work environment, employee satisfaction and performance in educational institutions, the banking sector, and the telecommunications industry in Pakistan is significant. The work environment and job satisfaction also positively correlated (Raziq & Maulabakhsh, 2015). Managers recognize the essential of a virtuous work environment to make best use of the level of job satisfaction. The researchs of Jain and Kaur (2014) and Muguongo, et al. (2015) also found that work environment influence the job satisfaction. The banking industry in India proves that the work environment that is not conducive negatively affect on employee satisfaction resulting in declining employee performance (Dhamija et al., 2019).
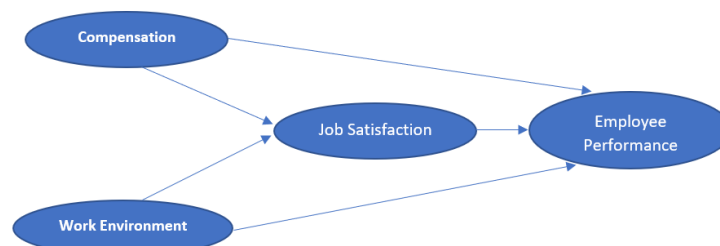
Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

4.6 Job satisfaction and employee performance

The result of the effect of job satisfaction on employee performance, as shown in figure 2 and table 8, indicates that the two variables positively and significantly related each other (Coefficient Value 0.756; T-Statistic 27,901> 1.96). Job satisfaction felt by employees will increase along with the increase in employee performance in polytechnic colleges. Therefore, hypothesis 7 in this study was accepted.

The findings support previous research in job satisfaction and employee performance (Amiroso & Mulyanto, 2015; Chong & Leung, 2018; Dhamija et al., 2019; Jiang & Zhang, 2018; Kataria et al., 2019; Martinson & De Leon, 2018). To improve overall performance, managers target and focus on the welfare of their employees so as to encourage employees to work better. This is an effort to satisfy the workers (Shahzad et al., 2018).

Job satisfaction is one important aspect in the practice of organizational behavior and human resource management. It means that job satisfaction can affect happiness, morale, and employee motivation in increasing productivity (Mabaso & Dlamini, 2017). Owusu (2014) states that job satisfaction is a feeling of preference or satisfaction with one's work or experience at work. This condition, according to him, can lead employees to a condition where they can improve their performance level. Meanwhile, in different conditions such as feeling displeased or emotionally dissatisfied at work, it can cause low performance of employees. Meanwhile, on the other hand, high performance is very important for the organization to achieve what has been the goal.

5. Conclusions

This study shows that compensation, satisfaction and performance are not correlated positively. In addition, job satisfaction as a mediating variable in compensation and employee performance is not proven. This means that even though compensation is increased for employees it doesn't improve their performance. It is because some employees consider that giving compensation by the organization is an obligation and a necessity for what employees give to the organization. State Polytechnic is expected to focus more on the work environment to improve employee performance. The current work environment in polytechnics both physically and non-physically is considered equally important by employees. To improve employee satisfaction, the work environment has proven to be a trigger for employees to feel satisfied with what they have been doing so that they will work more effectively and efficiently in helping the organization achieve its goals. The role of job satisfaction as compensation mediation on employee performance has been proven to have no effect either partially or simultaneously. Meanwhile, job satisfaction as a mediator in work environment and employee performance is proven positively and significantly. This shows that the work environment can improve employee performance both directly and indirectly through job satisfaction.

References

Abnur, A. (2016). Wawancara Hasil Survey Kinerja PNS Tahun 2016. *JPPN News*. Retrieved from http://www.jpnn.com/news/inilah-data-hasil-survei-kinerja-pns-tidak-mengejutkan-ya

Addis, S., Dvivedi, A., & Beshah, B. (2018). Determinants of job satisfaction in Ethiopia: Evidence from the leather industry. *African Journal of Economic and Management Studies*, *9*(4), 410–429. https://doi.org/10.1108/AJEMS-09-2017-0222

Ali Alsheikh, G. A., Ahmad Alremawi, M. S., & Bin A Tambi, A. M. (2018). The Mediating Role of Organizational Culture on the Relationship between Employee Performance and Antecedents in the Hotel Sector. *Journal of Reviews on Global Economics*, *6*, 489–497. https://doi.org/10.6000/1929-7092.2017.06.49

Amabile, TM., Conti, R., Coon, H., Lazenby, J., & Herron, M. (1996). Assesing the work environment for creativity. *Academy of Management Journal*, *39*(5), 1154 – 1184. https://doi.org/10.5465/256995

Amiroso, J., & Mulyanto. (2015). Influence of Discipline, Working Environment, Culture of Organization and Competence on Workers' Performance through Motivation, Job Satisfaction (Study in Regional Development Planning Board of Sukoharjo Regency). *European Journal of Business and Management*, *7*(36), 86–95. https://www.iiste.org/Journals/index.php/EJBM/article/view/27525

Anderson, R. G., Pyo, U., & Zhu, B. (2018). Does CEO compensation suppress employee wages? *Review of Accounting and Finance*, *17*(4), 426–452. https://doi.org/10.1108/RAF-04-2017-0065

Bernardin, John. H., & Russel, J. E. A. (1993). *Human Resources Management An Experiental Approach*. Singapore: McGraw-Hill, Inc.

Buachoom, W. (2017). Simultaneous relationship between performance and executive compensation of Thai non-financial firms. *Asian Review of Accounting*, *25*(3), 404–423. https://doi.org/10.1108/ARA-02-2016-0020

Che Ahmat, N. H., Arendt, S. W., & Russell, D. W. (2019). Effects of minimum wage policy implementation: Compensation, work behaviors, and quality of life. *International Journal of Hospitality Management*, *81*, 229–238. https://doi.org/10.1016/j.ijhm.2019.04.019

Chin, W. W. (1995). Partial least squares to lisrel as principal component analysis is to common factor analysis. *Technology Studies*, *2*, 315–319.

Chong, V., & Leung, S. T. (2018). The effect of feedback, assigned goal levels and compensation schemes on task performance. *Asian Review of Accounting*, *26*(3), 314–335. https://doi.org/10.1108/ARA-09-2017-0142

Dessler, G. (2000). *Human Resource Management* (8th ed.). New Jersey: Prentice-Hall.

Dhamija, P., Gupta, S., & Bag, S. (2019). Measuring of job satisfaction: The use of quality of work life factors. *Benchmarking: An International Journal*, *26*(3), 871–892. https://doi.org/10.1108/BIJ-06-2018-0155

El Samen, A., & Akroush, M. N. (2018). How customer orientation enhances salespeople's performance? A case study from an international market. *Benchmarking: An International Journal*, *25*(7), 2460–2477. https://doi.org/10.1108/BIJ-05-2017-0101

Ghozali, I. (2006). *Structural equation modeling: Metode alternatif dengan partial least square* (3rd ed.). Semarang: BP Universitas Diponegoro.

Gorondutse, A. H., & Hilman, H. (2019). Does organizational culture matter in the relationship between trust and SMEs performance. *Management Decision*, *57*(7), 1638–1658. https://doi.org/10.1108/MD-05-2018-0557

Hambali, M., & Idris, I. (2020). Transformational leadership, organizational culture, quality assurance, and organizational performance: Case study in Islamic higher education institutions (IHEIS). *Journal of Applied Management*, *18*(3), 572–587. http://dx.doi.org/10.21776/ ub.jam.2020.018.03.18

Handoko, T. H. (2006). *Manajemen Personalia dan Sumberdaya Manusia* (2nd ed.). Yogyakarta: BPFE.

Hasibuan, M. (2002). *Manajemen Sumber Daya Manusia*. Jakarta: Bumi Aksara.

Idris, I. (2019). Exploring organizational culture, quality assurance, and performance in higher education. *Management and Economics Journal (MEC-J)*, *3*(2), 166–181. https://doi.org/10.18860/mec-j.v3i2.7529

Idris, I., & Adi, K. R. (2019). Transformational Leadership and Team Performance: The Role of Innovation in Indonesia Property Agent Industry. *Proceedings of the 2018 International Conference on Islamic Economics and Business (ICONIES 2018)*, 334–338. Kota Malang, Indonesia: Atlantis Press. https://doi.org/10.2991/iconies-18.2019.67

Idris, Setiawan, M., Susilowati, C., Supriyanto, A. S., Ekowati, V. M., & Muhammad, F. (2020). Examining the role of political skill in transformational leadership and organizational performance; Empirical study from Indonesia. *SMART Journal of Business Management Studies*, *16*(2), 124–132. https://doi.org/10.5958/2321-2012.2020.00023.8

Igalens, J., & Roussel, P. (1999). A study of the relationships between compensation package, work motivation and job satisfaction. *Journal of Organizational Behavior*, *20*, 1003–1025. https://doi.org/10.1002/(SICI)1099-1379(199912)20:7%3C1003::AID-JOB941%3E3.0.CO;2-K

Jain, R., & Kaur, S. (2014). Impact of work environment on job satisfaction. *International Journal of Scientific and Research Publications*, *4*(1), 1–8. http://www.ijsrp.org/research-paper-0114.php?rp=P252212

Jamil, B., & Raja, N. S. (2011). Impact of Compensation, Performance Evaluation and Promotion Practices on Government Employees Performance VS Private Employees Performance. *Interdiciplinary Journal of Contemporary Research in Business*, *3*(8), 907–913.

Jiang, H., & Zhang, H. (2018). Regulatory restriction on executive compensation, corporate governance and firm performance: Evidence from China. *Asian Review of Accounting*, *26*(1), 131–152. https://doi.org/10.1108/ARA-07-2016-0080

Kataria, A., Garg, P., & Rastogi, R. (2019). Do high-performance HR practices augment OCBs? The role of psychological climate and work engagement. *International Journal of Productivity and Performance Management*, *68*(6), 1057–1077. https://doi.org/10.1108/IJPPM-02-2018-0057

Mabaso, C. M., & Dlamini, B. I. (2017). Impact of Compensation and Benefits on Job Satisfaction. *Research Journal of Business Management*, *11*(2), 80–90. https://doi.org/10.3923/rjbm.2017.80.90

Mangkunegara, A. P. (2009). *Evaluasi Kinerja SDM*. Bandung: Refika Aditama.

Martinson, B., & De Leon, J. (2018). Testing horizontal and vertical alignment of HR practices designed to achieve strategic organizational goals. *Journal of Organizational Effectiveness: People and Performance*, *5*(2), 158–181. https://doi.org/10.1108/JOEPP-10-2016-0057

Mathis, R. L., & Jackson, J. H. (2000). *Human Resource Management*. Jakarta: Salemba Empat.

Muguongo, Mary. M., Muguna, A. T., & Muriiti, D. K. (2015). Effects of Compensation on Job Satisfaction Among Secondary School Teachers in Maara Sub—County of Tharaka Nithi County, Kenya. *Journal of Human Resource Management*, *3*(6), 47. https://doi.org/10.11648/j.jhrm.20150306.11

Nitisemito, A. S. (2001). *Manajemen Personalia*. Jakarta: Ghalia.

Odunlade, R. O. (2012). Managing Employee Compensation and Benefits for Job Satisfaction in Libraries and Information Centres in Nigeria. *Library Philosophy and Practice*, *3*, 714–725. https://digitalcommons.unl.edu/libphilprac/714

Owusu, B. (2014). *An Assessment of Job Satisfaction and Its Effect on Employees' Performance: A Case of Mining Companies in The Bibiani, Anhwiaso, Bekwai District, in The Western Region* (Thesis). Kwame Nkrumah University of Science and Technology, South Africa.

Patiar, A., & Wang, Y. (2020). Managers' leadership, compensation and benefits, and departments' performance: Evidence from upscale hotels in Australia. *Journal of Hospitality and Tourism Management*, *42*, 29–39. https://doi.org/10.1016/j.jhtm.2019.11.005

Polychroniou, P., & Trivellas, P. (2018). The impact of strong and balanced organizational cultures on firm performance: Assessing moderated effects. *International Journal of Quality and Service Sciences*, *10*(1), 16–35. https://doi.org/10.1108/IJQSS-09-2016-0065

Purwadita, C. P., Sudiro, A., Mugiono, M., & Idris, I. (2018). Innovation in leadership and team performance: Evidence from indonesia property agent industry. *MEC-J (Management and Economics Journal)*, *2*(2), 117–132. http://dx.doi.org/10.18860/mec-j.v0i1.5221

Raziq, A., & Maulabakhsh, R. (2015). Impact of Working Environment on Job Satisfaction. *Procedia Economics and Finance*, *23*, 717–725. https://doi.org/10.1016/S2212-5671(15)00524-9

Salisu, J., Chinyio, E., & Suresh, S. (2015). The Impact of Compensation on the Job Satisfaction of Public Sector Construction Workers of Jigawa State of Nigeria. *The Business and Management Review*, *6*(4).

Sani, A., Wekke, I. S., Ekowati, V. M., Abbas, B., & Idris, I. (2018). Moderation effect of workplace spirituality on the organizational citizenship behavior. *International Journal of Applied Business and Economic Research*, *16*(2), 455–465.

Sani, Achmad, Ekowati, VM., Wekke, I. S., & Idris, I. (2018). Respective contribution of entrepreneurial leadership through organizational citizenship behavior In creating employees performance. *Academy of Entrepreneurship Journal*, *24*(4), 1–11.

Sedarmayanti, S. (2011). *Manajemen Sumber Daya Manusia, Reformasi Birokrasi, dan Manajemen Pegawai Negeri Sipil* (5th ed.). Bandung: Refika Aditama.

Shahzad, I. A., Farrukh, M., Kanwal, N., & Sakib, A. (2018). Decision-making participation eulogizes probability of behavioral output; job satisfaction, and employee performance (evidence from professionals having low and high levels of perceived organizational support). *World Journal of Entrepreneurship, Management and Sustainable Development*, *14*(3), 321–339. https://doi.org/10.1108/WJEMSD-01-2018-0006

Simamora, H. (2006). *Manajemen Sumberdaya Manusia*. Yogyakarta: STIE YKPN.

Soehardi, S. (2003). *Esensi Perilaku Organisasional*. Yogyakarta: BPFE UST.

Sopiah, S. (2013). The Effect of Compensation toward Job Satisfaction and Job Performance of Outsourcing Employees of Syariah Banks in Malang Indonesia. *International Journal of Learning and Development*, *3*(2), 77–91. https://doi.org/10.5296/ijld.v3i2.3612

Supriyanto, A. S., Ekowati, V. M., Idris, I., & Iswanto, B. (2020). Leadership Styles as a Predictor of the Voluntary Work Behaviors of Bank Employees. *International Journal of Economics and Management*, *14*(1), 1–11.

Syed, R. F. (2020). Job satisfaction of shrimp industry workers in Bangladesh: An empirical analysis. *International Journal of Law and Management*, *62*(3), 231–241. https://doi.org/10.1108/IJLMA-05-2018-0104

Zhang, Y., Cai, D., Jia, F., & Li, G. (2018). The Bounded Incentive Effect of Informal Institution: An Empirical Study of Executive Compensation Incentive Based on the Regional Trust Enviroment. *Nankai Business Review International*. https://doi.org/10.1108/NBRI-04-2018-0024

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Idris IDRIS is a researcher and lecturer in Faculty of Social Science, Universitas Negeri Malang, Indonesia. He is majoring in strategic management. His research interests include but not limited to Strategic Management, Human Resource Management, Leadership, Educational Management, and Tourism Management. He has a broad experience in consulting many public and private instituion.
ORCID ID: orcid.org/0000-0002-4518-0944

Khofifatu Rohmah ADI is a lecturer in Faculty of Social Science, Universitas Negeri Malang, Indonesia. She is majoring in Economic education. Her interests are Entrepreneurship, Microeconomics, Small-medium enterprise, financial literacy and economics education.
ORCID ID: orcid.org/0000-0002-0925-722X

Budi Eko SOETJIPTO is a Professor in Faculty of Economics, Universitas Negeri Malang, Indonesia. He is majoring in Management. His research interests are Human Resource Management, Leadership, citizenship organizational behavior, and organizational behavior.
ORCID ID: orcid.org/0000-0002-1170-2986

Achmad Sani SUPRIYANTO is a senior lecturer and Professor in Faculty of Economics and Business, State Islamic University of Maulana Malik Ibrahim Malang, Indonesia. He is majoring in human resource management. His research interests are Human Resource Management, Leadership, citizenship organizational behavior and Islamic Management.
ORCID ID: orcid.org/0000-0003-1519-3258

CRITICAL FACTORS AFFECTING LABOR PRODUCTIVITY WITHIN CONSTRUCTION PROJECT IMPLEMENTATION: A PROJECT MANAGER'S PERSPECTIVE

Nguyen Quoc Toan [1*], Nguyen Van Tam [2], Dinh Tuan Hai [3], Nguyen Le Dinh Quy [4*]

[1,2] *Faculty of Construction Economics and Management, National University of Civil Engineering, No. 55 Giaiphong Street, Hanoi, Vietnam*
[3] *Faculty of Urban Management, Hanoi Architectural University, Km 10, Nguyentrai Road, Hanoi, Vietnam*
[4] *FPT University, Hanoi, Vietnam*

E-mails: [4*] *QuyNLD@fe.edu.vn (Corresponding Author)*
[1*] *toannq@nuce.edu.vn (Co-corresponding Author)*

Abstract. The present study aims to identify critical factors affecting labor productivity within the construction project implementation from the project manager's viewpoint. By a comprehensive review of the previous studies, this study identified 45 critical factors impacting construction labor productivity, which were grouped as primary 6 groups include: manpower, management, work condition, project, and external factors. A total of 56 valid samples were collected by 65 project managers' respondents who completed a structured questionnaire survey according to their previous participation in or directly implementation construction projects. These critical factors were ranked based on their relative important index and descriptive statistics (i.e. mean and standard deviation). The analysis of the identified critical factors indicated that the most significant critical factors impacting construction labor productivity are 'ability of construction management, 'financial status of stakeholders', 'work discipline', 'design changes', 'timeliness of remuneration', 'economic conditions', 'lack of supervision', 'accident', 'availability of labors', and 'availability of materials'

Keywords: critical factors; labor productivity; construction project implementation; affecting; project managers

1. Introduction

For the economy of any country, the value of the construction industry has a significant contribution to the nation's gross domestic product. Despite the applied technological advancements, the construction industry remains a human-intensive industry (i.e. dependent upon effort and performance of the workforce) (Jarkas et al., 2014). Therefore, labor productivity plays a key role in assessing the success of construction projects which reflects the significant effect of this resource in the construction sector, meaning that any enhancement in labor productivity will contribute a high deal to enhance the project effectiveness (i.e., quality, cost, and time performances) (Mahamid, 2013b). In many countries, the construction labor cost would account for between 30% and 50% of the total cost of a construction project, so construction labor productivity as a determinant impacting almost construction projects' profitability (El-Gohary and Aziz, 2014, Hanna et al., 2002, McTague and Jergeas, 2002). Improving labor productivity seems is one of the most important objectives for any organization due to the fact it displays the efficiency and effectiveness conversion of sources into marketable merchandise and it determines commercial enterprise profitability (Wilcox et al., 2000). In this regard in the field of construction, many researchers have been conducted to purpose improvement labor productivity of construction practitioners (i.e., construction managers, engineers, architectures, and builders). Poor construction labor productivity is a major cause of influencing the quality, duration, and cost of construction projects (Mahamid, 2013b). Also, previous studies indicated that the loss of construction labor productivity is affected by various factors related to workforce, management, equipment and tools, materials, technology, and environment (Mustapha and Naoum, 1998, Van Tam et al., 2018, Enshassi et al., 2007, Alaghbari et al., 2019). However, perception of what factors affecting construction labor productivity may different depending on the roles of respondents in the construction project implementation (Perera et al., 2014). Therefore, the aim of this study is that identify and assess the critical factors impacting labor productivity within construction investement project implementation on basis of the awareness of project managers. The findings are expected to build a platform to implement better appropriate tasks towards improving construction labor productivity.

2. Literature Review

Productivity has been calculated is the ratio of the produced-outputs to the inputs that used to create the outputs (Coelli et al., 2005). In the construction context, construction labor productivity has been calculated is the rate of between the work units accomplished (i.e., outputs quantity) and the work hours (i.e., inputs for labors) (Ghoddousi and Hosseini, 2012, Enshassi et al., 2007). To enhance construction labor productivity, identifying critical factors that have influence labor productivity in the organization of construction projects is necessary. Therefore, various factors impacting labor productivity in the construction sector have been proposed and categorized by numerous scientific researchers from different countries as represented in the previous researches.

The studies of (Lim and Alum, 1995) conducted in Singapore that indicated that the most factors impacting construction labor productivity include difficult with the manpower recruitment, on-site supervisors recruitment, high labor income rate, construction site absenteeism, and problems of communication with oversea construction workers, whereas, in Saudi Arabia, top five factors include workforce experience and skills, lack of communication by construction stakeholders, poor relations between employees and their managers, timeliness of remuneration, and schedule delay (Mahamid et al., 2013). In Iran construction industry, (Zakeri et al., 1996) stated that lack of materials, severe weather and on-site conditions, low quality of equipment and tools, drawing quality, change orders, and proper equipment shortages which were the most factors impacting labor productivity, while, as shown in the research of (Jarkas et al., 2012), the top critical factors that have an important effect on construction labor productivity in Qatar such as supervision, labor skills, lack of materials, lack of experienced labor, communication, shortage of leadership of construction managers, high-temperature, delays in responding to "Requests For Information", shortage of providing labor with transportation, and percentage of work subcontracted.

(Alaghbari et al., 2019) studied factors impacting construction labor productivity in Yemen, the studies classified a total of 52 factors into four main categories that are human/labor group (8 factors), management group (17 factors), technical and technological group (12 factors), and external group (15 factors). In Bahrain, (Jarkas, 2015) grouped 37 factors into 4 primary categories that are management (19 factors), technological (11 factors), labor (3 factors), and external (4 factors), while (Jarkas et al., 2015) stated that there were 33 factors affecting construction labor productivity in Oman, which grouped into 4 four categories, including management (13 factors), technological (12 factors), labor (3 factors), and exogenous (5 factors). A total of 45 factors impacting labor productivity in building projects in the Gaza Strip were proposed by (Enshassi et al., 2007), who categorized these factors into 10 groups that are manpower (10 factors), leadership (3 factors), motivation (6 factors), time (5 factors), materials/tools (3 factors), supervision (4 factors), project (4 factors), safety (7 factors), quality (3 factors), and external (2 factors). The study of (Hiyassat et al., 2016) was conducted in Jordan, which indicated that 27 variables influencing construction labor productivity that were categorized by dimensions such as by dimensions such as creating a plan, the relations between craftsman and managers, education levels and labor experience, climate conditions, adopted technology, labor motivation, safety conditions, worker personal problems, and impact of religion.

In many years, the topic of factors influencing construction labor productivity has been concerned by numerous researchers. Consequently, various critical factors influencing construction workforce productivity have been demonstrated and grouped by lots of studies from many countries. However, the frequency and impact levels of these critical factors quite different from project to project or nation to nation, and even in the same construction project, depending on specific situations (Olomolaiye et al., 1998). Therefore, a task to divide these factors toward major global categories, it may relate and enclose to the numerous factors is critical. Based on referencing and considering previous studies, the present study synthesized critical factors impacting labor productivity in the construction implementation. A total of 45 critical factors influencing labor productivity within construction project implementation, which are divided into six categories as follows: (1) manpower (7 factors), management (13 factors), motivation (8 factors), work condition (5 factors), project (7 factors), and external (5 factors).

3. Research Methodology

The present study was carried out based on a questionnaire survey aimed at effectively collecting all the necessary data. As mentioned above, a total of 45 factors that impact labor productivity within the implementation of construction projects were identified. These factors were then tabulated in the form of a questionnaire.

The questionnaire survey was contained two major parts. The structured first part contains demographic information on the participants (i.e., education levels, qualifications, positions, and professional experience) whose main objective was to illustrate the participants in order to ensure reliability in this study outcomes. The structured second part contained the list of these identified factors. To collect needed data, participants were surveyed for interviews on the basis of their previous take part in or directly implementation construction investment projects in Vietnam. Based on their experience, they will assess the impact degree of the critical factors construction labor productivity following a 5-point Likert scale (i.e.,1-Very low effect, 2-Low effect, 3-Moderate effect, 4-High effect, 5-Very high effect).

For analyzing data, this study used the Relative Importance Index (RII) approach to evaluate the levels of impact of these critical factors influencing labor productivity within the construction project implementation. The RII method was adopted by numerous studies (i.e., (Alaghbari et al., 2019, Jarkas, 2015, Jarkas et al., 2012, Hiyassat et al., 2016, Gunduz and Abdi, 2020). The RII index was assessed based on the below formula 'Eq. (1)' as follows:

$$RII = \frac{\sum_{i=1}^{5} W_i \times X_i}{5 \sum_{i=1}^{5} X_i} \qquad (1)$$

Where: W_i is the rating given to factor by the respondent ranging from one to five; X_i is the proportion of respondents scoring; i is the order score ranging between one and five.

Responses from the first part can be obtained through the appropriate response choice. In the second part participants needed to assess the factors that influence construction labor productivity on a Likert scale from 1 (very low influence) to 5 (very high influence). The RII index is applied to evaluate these factors influencing construction labor productivity as perceived by the participants and, therefore, a comparative analysis is possible.

The collection of case-specific data was conducted by respondents who engaged with construction projects in Vietnam and working as project managers. A total of 73 samples were distributed by email and face-to-face interviews. Only 65 answers were received, and 56 qualified responses for research, representing an effective rate of 76.7%.

4. Results and Discussions

In the present study, there are two software applications were applied to examine the findings, which are MS Excel 365 and SPSS 22. A total of 45 critical factors affecting labor productivity within construction project implementation have been identified and ranked on the basis of their descriptive statistics (i.e., mean and standard deviation), and the RII index.

4.1. Manpower factors group

Table 1: Ranking of factors under manpower group

Factors	M	SD	RII	Rank
Work discipline	3.946	0.840	0.789	1
Labors' experience and skills	3.821	1.081	0.764	2
Age of labors	3.714	1.124	0.743	3
Strength and physical of labors	3.714	1.091	0.743	4
Absenteeism	3.696	1.094	0.739	5
Labor's education level	3.536	0.934	0.707	6
Personal problems	3.429	1.093	0.686	7

Note: M is Mean, SD is Standard Deviation, and RII is Relative Importance Index

Table 1 indicates the ranking of 7 factors related to the manpower category. The results statistics of project managers' respondents indicate that 'work discipline' with RII=0.789 was ranked the 1st in this group and ranked 3th in the overall ranking (Table 8), which proves that this factor has a very high impact on labor productivity within construction project implementation. This finding in the line with some previous studies (i.e., (Van Tam et al., 2018, Durdyev and Mbachu, 2011, Enshassi et al., 2007, Gerges et al., 2011). With RII=0.764, 'labors' experience and skills' factor was ranked 2nd in this group and assessed 12th among all 45 factors, which indicates that the factor has a high influence on labor productivity. Followed by 'age of labors' (RII=0.743), 'strength and physical of labor' (RII=0.743), 'Labor absenteeism' (RII=0.739) was ranked 3rd, 4th, and 5th respectively in the category. Finally, 'labor's education level' (RII=0.707), and 'personal problems' (RII=0.686) was assessed at the end of manpower group, and ranked 33rd, 39th in overall ranking respectively, which shows that these factors have a low impact on labor productivity within construction project implementation.

4.2. Management factors group

The ranking of 13-factor under management category was provided in Table 2, with RII=0.814, the surveyed project managers ranked 'ability of construction management' it the 1st in this group. This factor was also assessed is the first factor among 45 critical factors, which proves that this factor has a very high effect on labor productivity within construction project implementation. This evidence was further supported by (Ghahramanzadeh, 2013), who stated that project managers' incompetence is one of the serious issues barrier the labor productivity improvement in the Iran construction sector. The ranking is also in line with the study by (Ghoddousi and Hosseini, 2012), which showed that the competence of project managers as an important factor impacting the labor productivity of construction projects.

Table 2: Ranking of factors under management group

Factors	M	SD	RII	Rank
Ability of construction management	4.071	0.850	0.814	1
Financial status of stakeholders	3.982	0.963	0.796	2
Lack of supervision	3.875	0.634	0.775	3
Availability of labors	3.857	0.819	0.771	4
Availability of materials	3.839	1.156	0.768	5
Site management	3.714	1.074	0.743	6
Rework	3.679	1.309	0.736	7
On-site storage	3.679	1.011	0.736	8
Availability of equipment/tools	3.643	1.212	0.729	9
Lack of supervisors' experience	3.554	1.043	0.711	10
Working overtime	3.518	1.128	0.704	11
Communication	3.482	1.206	0.696	12
Construction methods	3.375	1.169	0.675	13

With the RII ranging between 0.796 and 0.768, four factors have a significant effect on construction labor productivity such as 'financial status of stakeholders', 'lack of supervision', 'availability of labors', and 'availability of materials' which ranked 2nd, 3rd, 4th, and 5th in this ground and evaluated 2nd, 7th, 9th, and 10th among al critical factors, in turn. In fact, construction activities are implemented with many resources, one of which financial, labors, materials play an important role. Many buildings needed a large amount of capital and almost of contractors perceive it exceptionally troublesome to bear the high daily execution expenses in the case of laborers' salaries are delayed (Mahamid, 2013a). The outcomes of researches (i.e., (Hai and Van Tam, 2019, Alinaitwe et al., 2007, Kadir et al., 2005), which demonstrated that the limitation of finances as a problem in improving labor productivity. With the RII ranging between 0.704 and 0.675, the surveyed project managers ranked three factors are 'working overtime', 'communication', and 'construction methods' at the end of this group, which reveals that three factors have a very low influence on construction labor productivity.

4.3. Motivation factors group

Table 3 provides the ranking of factors relevant to the motivation category, 8 critical factors are identified under this group. The surveyed respondents ranked factors of 'timeliness of remuneration' (RII=0.782) and 'amount of remuneration' (RII=0.764) were ranked the first and the second in this category, and assessed the 5th, and 11th overall ranking, respectively. The finding indicates that these factors as determinants impact on construction labor productivity. This ranking was supported by the studies of (Ghoddousi et al., 2014, Tabassi and Bakar, 2009), which explained that managers are the good perception that construction craftsman still has to face with low salary, which has been identified as a problem in many countries and late payments have a dramatic effect on the main aspects of productivity in the construction sector (Tam et al., 2004, Jarkas and Radosavljevic, 2013, Perera et al., 2014, Kaliba et al., 2009).

Table 3: Ranking of factors under motivation group

Factors	M	SD	RII	Rank
Timeliness of remuneration	3.911	0.880	0.782	1
Amount of remuneration	3.821	1.011	0.764	2
Work satisfaction	3.804	1.313	0.761	3
Promote opportunities	3.732	1.228	0.746	4
Rewards/Punishments	3.679	1.309	0.736	5
Motivation of laborers	3.589	1.290	0.718	6
Lack of labor recognition programs	3.375	1.001	0.675	7
Creating competition	3.339	1.405	0.668	8

With the RII ranging between 0.761 and 0.736, three factors have a significant impact on labor productivity in construction project implementation such as 'work satisfaction', 'promote opportunities', and 'rewards/punishments' which ranked 3rd, 4th, and 5th in this category and 13th, 16th, and 26th among 45 critical factors, respectively. Finally, factors of 'motivation of laborers', 'lack of labor recognition programs', and 'creating competition' were ranked at the end in the motivation group, with RII are 0.718, 0.675, and 0.668 respectively. The ranking reveals that this 3-factor has a low effect on construction labor productivity.

4.4. Work condition factors group

As demonstrated in Table 4, with RII=0.786, the analysis result indicated that 'accident' factor was ranked the 1st in this group and the 8th overall ranking, which shows that the factor has a very high impact on labor productivity within construction project implementation. Followed by the factor of 'healthy and safety conditions' (RII=0.754) was assessed the second in the work condition group and 14th among all factors, which reveals that this factor as a determinant on construction labor productivity. The evidence in the line with the outcomes of some previous studies (i.e., (Ghoddousi et al., 2015, Ghoddousi and Hosseini, 2012), which explained that the construction industry is knowns for its poor working conditions and the adoption of health and safety measures in several developing countries.

In this category, the factor of 'working security' (RII=0.746) was ranked the 3rd in this category and 15th among 45 factors, whereas 'working space' (RII=0.707) was ranked the 4th under work condition group and 25th overall ranking. With RII=0.682, 'height of work site' was evaluated at the end of this group and 40th among all factors. This ranking indicates that the factor has a very low impact on construction labor productivity.

Table 4: Ranking of factors under work condition group

Factors	M	SD	RII	Rank
Accident	3.857	0.943	0.771	1
Healthy and safety conditions	3.768	1.009	0.754	2
Work security	3.732	0.963	0.746	3
Working space	3.536	0.852	0.707	4
Height of work site	3.411	1.092	0.682	5

4.5. Project factors group

Table 5 demonstrates the ranking of factors relevant to the project group, 7 critical factors are identified under this category. With RII=0.786, the surveyed respondents ranked 'design changes' is the 1st position in this group and the 4th among 45 critical factors, which indicates that this factor has a significant impact on labor productivity within construction project implementation. This ranking was further supported by the study of (Enshassi et al., 2007), which demonstrated that specification alteration during the construction project organization was the primary factor impacting labor productivity.

Table 5: Ranking of factors under project group

Factors	M	SD	RII	Rank
Design changes	3.929	0.871	0.786	1
Effective project	3.696	0.913	0.739	2
Drawing quality	3.679	0.855	0.736	3
Project location	3.571	1.024	0.714	4
Design complexity	3.554	1.111	0.711	5
Sub-contractor	3.446	1.174	0.689	6
Project type	3.250	1.014	0.650	7

With the RII ranging between 0.739 and 0.714, three factors have a significant effect on construction labor productivity such as 'effective project s', 'drawing quality', and 'project location' which ranked 2nd, 3rd, and 4th under project category and assessed 20th, 23th, and 30th overall ranking, respectively. Finally, critical factors such as 'design complexity' (RII=0.711), 'sub-contractor' (RII=0.689), and 'project type' (RII=0.650) were ranked at the end of this category. The ranking reveals that these factors have a low influence on labor productivity within construction project implementation.

4.6. External factors group

Table 6: Ranking of factors under external group

Factors	M	SD	RII	Rank
Economic conditions	3.893	0.966	0.779	1
Weather conditions	3.679	1.377	0.736	2
Regulation and law	3.607	1.139	0.721	3
Social culture	3.482	0.934	0.696	4
Geological and hydrological conditions	3.375	1.169	0.675	5

The results of Table 6 indicate that 5-factor of the external group has been ranked by the RII index under perceptions of project managers. The surveyed respondents evaluated 'economic conditions' (RII=0.779) was the first in this category and ranked sixth overall ranking, which indicates that the factor as a determinant having a significant influence on labor productivity in the construction project implementation. Followed by factors of 'weather conditions'(RII=0.736), and 'regulation and law' were assessed the second and third positions in the group and 24th and 28th among 45 identified factors, respectively. The finding was supported by studies of (Kaming et al., 1997, Van Tam et al., 2018), which demonstrated that construction activities are significantly impacted by weather conditions. Finally, with RIIs are 0.696 and 0.675, 'social culture' and 'geological and hydrological conditions' were ranked at the end of this group, which proves that these two factors have a low impact on construction labor productivity.

4.7. Overall ranking critical factors influencing labor productivity within construction project implementation

The overall perceived impacts of all 45 factors were shown in Table 7. As provided, the top five ranking critical factors influencing labor productivity within construction project implementation as follows: 'ability of construction management, 'financial status of stakeholders', 'work discipline', 'design changes', 'timeliness of remuneration', 'economic conditions', 'lack of supervision', 'accident', 'availability of labors', and 'availability of materials'. The ranking reveals that the top ten factors have a significantly important impact on construction labor productivity.

Table 7: Overall ranking critical factors influencing labor productivity within construction project implementation

Factors	M	SD	RII	Rank
Ability of construction management	4.071	0.850	0.814	1
Financial status of stakeholders	3.982	0.963	0.796	2
Work discipline	3.946	0.840	0.789	3
Design changes	3.929	0.871	0.786	4
Timeliness of remuneration	3.911	0.880	0.782	5
Economic conditions	3.893	0.966	0.779	6
Lack of supervision	3.875	0.634	0.775	7
Accident	3.857	0.943	0.771	8
Availability of labors	3.857	0.819	0.771	9
Availability of materials	3.839	1.156	0.768	10

Factors	M	SD	RII	Rank
Amount of remuneration	3.821	1.011	0.764	11
Labors' experience and skills	3.821	1.081	0.764	12
Work satisfaction	3.804	1.313	0.761	13
Healthy and safety conditions	3.768	1.009	0.754	14
Work security	3.732	0.963	0.746	15
Promote opportunities	3.732	1.228	0.746	16
Age of labors	3.714	1.124	0.743	17
Strength and physical of labors	3.714	1.091	0.743	18
Site management	3.714	1.074	0.743	19
Effective project	3.696	0.913	0.739	20
Absenteeism	3.696	1.094	0.739	21
Rework	3.679	1.309	0.736	22
Drawing quality	3.679	0.855	0.736	23
Weather conditions	3.679	1.377	0.736	24
On-site storage	3.679	1.011	0.736	25
Rewards/Punishments	3.679	1.309	0.736	26
Availability of equipment/tools	3.643	1.212	0.729	27
Regulation and law	3.607	1.139	0.721	28
Motivation of laborers	3.589	1.290	0.718	29
Project location	3.571	1.024	0.714	30
Design complexity	3.554	1.111	0.711	31
Lack of supervisors' experience	3.554	1.043	0.711	32
Labor's education level	3.536	0.934	0.707	33
Working space	3.536	0.852	0.707	34
Working overtime	3.518	1.128	0.704	35
Social culture	3.482	0.934	0.696	36
Communication	3.482	1.206	0.696	37
Sub-contractor	3.446	1.174	0.689	38
Personal problems	3.429	1.093	0.686	39
Height of work site	3.411	1.092	0.682	40
Lack of labor recognition programs	3.375	1.001	0.675	41
Geological and hydrological conditions	3.375	1.169	0.675	42
Construction methods	3.375	1.169	0.675	43
Creating competition	3.339	1.405	0.668	44
Project type	3.250	1.014	0.650	45

5. Conclusions and recommendations

The present study aimed to identify a total of 45 critical factors influencing labor productivity within construction project implementation, which were grouped into the main 6-category that are manpower, management, work condition, project, and external factors. The data was collected by 56 valid surveyed questionnaires with participants of construction project managers, and critical factors were ranked based on their RII index and descriptive statistics. The results highlight the primary factors impacting construction labor productivity in construction projects as perceived by project managers, including 'ability of construction management, 'financial status of stakeholders', 'work discipline', 'design changes', 'timeliness of remuneration', 'economic conditions', 'lack of supervision', 'accident', 'availability of labors', and 'availability of materials'.

On the basis of the findings, the following recommendations are suggested as a way to improve labor productivity within the construction project implementation.

1. Project management unit should encourage construction project managers to learn practical skills and real experience about construction management through programs of regular training the help them to keep up to date and aware of valuable project management skills that have to be enhanced.

2. The project management unit should create workshops and training courses to help project managers to improve the managerial experience and skills as well as keep management activities on construction sites to enhance quality and prevent incorrect productions.

3. It is necessary owners should pay progress payment to contractors on time because it affects the contractors' ability to finance the work, leading to a shortage in materials and delay payments to laborers which affect their motivation to work.

4. The project management unit should introduce regulations and rules in the working environment to control the work discipline of the construction workforce. Besides, it is necessary to create recognition programs (i.e. rewards or punishment) to encourage laborers to keep their discipline on site which also makes significant restriction accidents in the construction project implementation.

5. Project managers should supervise and control materials supply for each specific construction project. This schedule should involve the time required to supply materials and the materials available on the local market to supply the required materials in time. In addition, the project management unit should require contractors should also select a reasonable storage location for purchased materials in each project, which should be easily accessible and close to implement projects and to avoid wastage of labor time for multiple-handling materials.

6. The project management unit should reduce design changes by the way that strongly controls the quality of drawings at the design stage order to explore errors or conflicts which can restrict reworks. Also, applying for construction management technology advances (i.e., building information modeling-BIM, scan to BIM,...) in the construction project implementation should be encouraged which can lead to improving project performance and profit maximum.

Although some results have been concluded from the present study, the authors encourage other researchers to replicate this topic in many different areas, countries, so that the important factors revealing elsewhere, and the bases platform the related findings can further support to the comprehensive theoretical understanding of the more complex problems of the construction labor productivity topic and the critical factors related with specific socioeconomic conditions and cultural backgrounds.

References

Alaghbari, W., Al-Sakkaf, A. A., & Sultan, B. (2019). Factors affecting construction labour productivity in Yemen. International Journal of Construction Management, 19(1), 79-91. https://doi.org/10.1080/15623599.2017.1382091

Alinaitwe, H. M., Mwakali, J. A., & Hansson, B. (2007). Factors affecting the productivity of building craftsmen-studies of Uganda. Journal of Civil Engineering and Management, 13(3), 169-176. https://www.tandfonline.com/doi/citedby/10.1080/13923730.2007.9636434?scroll=top&needAccess=true

Akmam Syed Zakaria, S., & Amtered El-Abidi, K. M. (2020). Economic effects of migrant labor on industrialized building system (IBS) adoption in the Malaysian construction industry. Architectural Engineering and Design Management, 1-17. https://doi.org/10.1080/17452007.2020.1781587

Coelli, T. J., Rao, D. S. P., O'Donnell, C. J., & Battese, G. E. (2005). An introduction to efficiency and productivity analysis. Springer Science & Business Media. https://link.springer.com/book/10.1007/978-1-4615-5493-6

Durdyev, S., & Mbachu, J. (2011). On-site labour productivity of New Zealand construction industry: Key constraints and improvement measures. Construction Economics and Building, 11(3), 18-33. https://doi.org/10.5130/AJCEB.v11i3.2120

Dixit, S., & Sharma, K. (2020). An Empirical Study of Major Factors Affecting Productivity of Construction Projects. In Emerging Trends in Civil Engineering (pp. 121-129). Springer, Singapore. https://doi.org/10.1007/978-981-15-1404-3_12

El-Gohary, K. M., & Aziz, R. F. (2014). Factors influencing construction labor productivity in Egypt. Journal of management in engineering, 30(1), 1-9. https://doi.org/10.1061/(ASCE)ME.1943-5479.0000168

Enshassi, A., Mohamed, S., Mustafa, Z. A., & Mayer, P. E. (2007). Factors affecting labour productivity in building projects in the Gaza Strip. Journal of civil engineering and management, 13(4), 245-254. https://www.tandfonline.com/doi/abs/10.1080/13923730.2007.9636444

Gerges, M., Ahiakwo, O., Aziz, R., Kapogiannis, G., Saidani, M., & Saraireh, D. (2011). Investigating and ranking labor productivity factors in the Egyptian Construction Industry. Journal of Architecture, 5(1), 44-52. https://arro.anglia.ac.uk/701059/

Ghahramanzadeh, M. (2013). Managing risk of construction projects: A case study of Iran (Doctoral dissertation, University of East London). http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.426.4071&rep=rep1&type=pdf

Ghoddousi, P., Bahrami, N., Chileshe, N., & Hosseini, M. R. (2014). Mapping site-based construction workers' motivation: Expectancy theory approach. Australasian Journal of Construction Economics and Building, The, 14(1), 60. https://search.informit.com.au/documentSummary;dn=200761448941712;res=IELBUS

Ghoddousi, P., Poorafshar, O., Chileshe, N., & Hosseini, M. R. (2015). Labour productivity in Iranian construction projects. International Journal of Productivity and Performance Management. https://doi.org/10.1108/IJPPM-10-2013-0169

Gunduz, M., & Abdi, E. A. (2020). Motivational Factors and Challenges of Cooperative Partnerships between Contractors in the Construction Industry. Journal of Management in Engineering, 36(4), 04020018. https://doi.org/10.1061/(ASCE)ME.1943-5479.0000773

Gurmu, A. T. (2019). Tools for measuring construction materials management practices and predicting labor productivity in multistory building projects. Journal of Construction Engineering and Management, 145(2), 04018139. https://doi.org/10.1061/(ASCE)CO.1943-7862.0001611

Hai, D. T., & Van Tam, N. (2019). Application of the Regression Model for Evaluating Factors Affecting Construction Workers' Labor Productivity in Vietnam. The Open Construction & Building Technology Journal, 13(1). https://openconstructionbuildingtechnologyjournal.com/VOLUME/13/PAGE/353/

Hanna, A. S., Peterson, P., & Lee, M. J. (2002). Benchmarking productivity indicators for electrical/mechanical projects. Journal of construction engineering and management, 128(4), 331-337. https://doi.org/10.1061/(ASCE)0733-9364(2002)128:4(331)

Hamza, M., Shahid, S., Bin Hainin, M. R., & Nashwan, M. S. (2019). Construction labour productivity: review of factors identified. International Journal of Construction Management, 1-13. https://doi.org/10.1080/15623599.2019.1627503

Hiyassat, M. A., Hiyari, M. A., & Sweis, G. J. (2016). Factors affecting construction labour productivity: a case study of Jordan. International Journal of Construction Management, 16(2), 138-149. https://doi.org/10.1080/15623599.2016.1142266

Jarkas, A. M. (2015). Factors influencing labour productivity in Bahrain's construction industry. International journal of construction management, 15(1), 94-108. https://doi.org/10.1080/15623599.2015.1012143

Jarkas, A. M., Al Balushi, R. A., & Raveendranath, P. K. (2015). Determinants of construction labour productivity in Oman. International journal of construction management, 15(4), 332-344. https://doi.org/10.1080/15623599.2015.1094849

Jarkas, A. M., Radosavljevic, M., & Wuyi, L. (2014). Prominent demotivational factors influencing the productivity of construction project managers in Qatar. International Journal of Productivity and Performance Management. https://doi.org/10.1108/IJPPM-11-2013-0187

Kadir, M. A., Lee, W. P., Jaafar, M. S., Sapuan, S. M., & Ali, A. A. A. (2005). Factors affecting construction labour productivity for Malaysian residential projects. Structural survey. https://doi.org/10.1108/02630800510586907

Kaming, P. F., Olomolaiye, P. O., Holt, G. D., & Harris, F. C. (1997). Factors influencing construction time and cost overruns on high-rise projects in Indonesia. Construction Management & Economics, 15(1), 83-94. https://doi.org/10.1080/014461997373132

Mahamid, I. (2013). Contractors perspective toward factors affecting labor productivity in building construction. Engineering, Construction and Architectural Management. https://doi.org/10.1108/ECAM-08-2011-0074

Mahamid, I., Al-Ghonamy, A., & Aichouni, M. (2013). Major factors influencing employee productivity in the KSA public construction projects. International Journal of Civil & Environmental Engineering IJCEE-IJENS, 14(01), 16-20.

G. 2002. Productivity improvements on Alberta major construction projects: Phase I-Back to basics, Alberta economic development. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.655.5507&rep=rep1&type=pdf

Ghodrati, N., Wing Yiu, T., Wilkinson, S., & Shahbazpour, M. (2018). Role of management strategies in improving labor productivity in general construction projects in New Zealand: Managerial perspective. Journal of Management in Engineering, 34(6), 04018035. https://doi.org/10.1061/(ASCE)ME.1943-5479.0000641

Perera, B. A. K. S., Rameezdeen, R., Chileshe, N., & Hosseini, M. R. (2014). Enhancing the effectiveness of risk management practices in Sri Lankan road construction projects: A Delphi approach. International Journal of Construction Management, 14(1), 1-14. https://doi.org/10.1080/15623599.2013.875271

Quy, N. L. D. (2020). An Overview of the Relationship between Psychological Capital and Entrepreneurial Orientation of Startup Companies. VNU Journal of Science: Policy and Management Studies, 36(1). https://doi.org/10.25073/2588-1116/vnupam.4206

Tabassi, A. A., & Bakar, A. A. (2009). Training, motivation, and performance: The case of human resource management in construction projects in Mashhad, Iran. International journal of project management, 27(5), 471-480. https://doi.org/10.1016/j.ijproman.2008.08.002

Van Tam, N., Huong, N. L., & Ngoc, N. B. (2018). Factors affecting labour productivity of construction worker on construction site: A case of Hanoi. Journal of Science and Technology in Civil Engineering (STCE)-NUCE, 12(5), 127-138. https://doi.org/10.31814/stce.nuce2018-12(5)-13

Wilcox, S., Stringfellow, B., Harris, R., & Martin, B. (2000). Management and productivity. Transportation research board, committee on management and productivity. Washington, USA. http://onlinepubs.trb.org/onlinepubs/millennium/00070.pdf

Nguyen Quoc TOAN works at Faculty of Construction Economics and Management, National University of Civil Engineering, Vietnam.
ORCID ID: 0000-0001-7086-2974

Nguyen Van TAM works at Faculty of Construction Economics and Management, National University of Civil Engineering, Vietnam.
ORCID ID: 0000-0001-6238-6082

Dinh Tuan HAI works at Faculty of Urban Management, Hanoi Architectural University, Km 10, Nguyentrai Road, Hanoi, Vietnam.
ORCID ID: 0000-0002-3687-8566

Nguyen Le Dinh QUY works at FPT Polytechnic - FPT University, Hanoi, Vietnam.
ORCID ID: 0000-0002-2825-5924

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

PROVIDING OF TOURISM ORGANIZATIONS SUSTAINABILITY THROUGH TRIPLE BOTTOM LINE APPROACH[*]

Adriana Csikósová [1], Mária Janošková [2], Katarína Čulková [3]

[1,3] *Technical University of Košice, Letna 9, Košice, Slovakia*
[2] *Department of Management Poprad, Catholic University in Ružomberok, Slovakia*

E-mails:[1] adriana.csikosova@tuke.sk, [2] maria.ria.janoskova@ku.sk, [3] katarina.culkova@tuke.sk

Abstract. The hospitality industry´s footprint is characterized by heavy resource consumption and significant waste production. Due to the sustainability there is necessary to use triple bottom line approach, to measure hospitality industry impact on people, the planet and profits (3P criteria). The hospitality has improved its efforts to effectively measure and protect natural resources, but P pillar of social sustainability is increasingly highlighting the role of people. Hospitality sector does not publicly report any of the criteria; only the activities associated with social care and overall welfare. Therefore, we researched possibility to use a joint sustainability index to measure the 3Ps for hospitality industries. The results reveal methods, models, inputs, and outcomes and define the users by anticipating their needs in terms of new sustainability measures in the hospitality industry. The results show that the planet category was weighted the highest, the people category was weighted highly for satisfaction, and profit category was weighted on the upper scale during the research period. This contribution employs a hospitality organization model, but the ideas can be extended to whole other types of organizations.

Keywords: People; Planet; Profit; Sustainability index; TBL – Triple Bottom Line, Hospitality

1. Introduction

Sustainability has become a mantra for the 21th Century (Dyllick & Hockerts, 2002). There is exhaustive list of definitions explaining sustainability, the oldest one is from 1972 UN Stockholm conference. "The growth of this broader ´world sustainability' viewpoint can be seen in the number of companies that have begun reporting on more than just financial operations" (Jackson et al., 2011; GRI, 2002). As sustainable management has evolved to span beyond organizational boundaries, firms increasingly realize the importance of TBL embracing (Shou et al., 2019).

The tourism as "green washing" underwent many redefinitions towards wider aspect of sustainability (Lozano-Oyola et al., 2019; Sheldon et al., 2005). Due to the growing importance of sustainability to the hospitality and tourism industry (Boley, 2011), Elkington made well-known model of the "Triple Bottom Line", which measure impact of industries on 3P – People, Planet, and Profit. Its goals and objectives are orientated to the sustainability (Elkington, 1997; Ho & Taylor, 2007). This approach intends also to guide managers towards the sustainable operations, supported by government, since sustainability became an agenda, as part of each company objectives (Dyllick & Hockerts, 2002; Lippman, 2010). Regarding TBL approach, companies add to their traditional economical goals (profit) also goals, orientated to the environmental (planet), social and ethical view (people) (e.g. Dainiené & Dagilené, 2015; Mintz, 2011). To find balance in satisfying every "P" of hospitality life cycle, many challenges arose, all together with ambition of unifying all under joint index. Sustainability in tourism industry is currently indexing the destination, industry, event management, procurement etc. (Janošková & Palaščáková, 2018; Pardo, 2018). But the industry does not index the hospitality organization, not yet considering all aspects of sustainability. Present researches of sustainability in area of tourism are orientated only to the motivations and attitudes of tourism services users (Dinica, 2018; Faux, 2005).

Different development of hospitality and tourism policies became in many ways source of new pressure for creating competitive measurable environment (Khan, 2017). Promoting and realizing unbearable situation with increased waste production challenges in employing and maintaining right people with service focused minds and sufficient business revenues (Lee & Park, 2009). This situation brought another opportunity for creation of new hospitality sustainability indexing, covering all aspects for 3P model under sustainability. Elkington 3Ps serves currently as the referential model of each hospitality company or tourism destination. Stakeholders and shareholders are part of sustainability in form of a produced „carbon footprint", employee happiness index and societal impact reflected in employment, ecology, community service etc. (Elkington, 1997).

Tourism has been defined by the United Nation World Tourism Organization as a social, cultural and economic phenomenon that involves the stay of people in countries and places beyond their standard home for personal or professional purposes (Butzmann & Job, 2017). World Travel and Tourism Council (WTTC) raises awareness of tourism as one of the largest industries supporting 266 million jobs generating 9% of global GDP. Due to the tourism importance to sustainability, we face a large amount of "tourism product" - accommodation and services (UNWTO, 2014). A whole phenomenon of tourism is repeatedly affecting the global environment through people and planet. The society has responded promptly to this growing trend, establishing measurable unit under the term "carbon footprint", directly or indirectly caused by the activity (WTTC, 2018; Lynn, 2009). This lifetime of the product can be incorporated into one common and consistent model, consisting of data from all three dimensions of sustainability. This is presently part of corporate social responsibility (e.g. Fry et al., 2018; Agan et al., 2016; Kang et al., 2010; Antošová & Csikósová, 2016).

Science documented negative impacts of tourism on the environment. The research regards environmental and sustainability considerations. As presented by Willard and Faux nowadays we faced a wave of anti-globalization and a wave of sustainable development and Breakthrough Decade (Willard, 2002; Faux, 2005). The best-known contemporary researcher on sustainable development with a clearly defined model is John Elkington, who found Triple Bottom Line Approach (TBL). This approach represents an effective tool of what sustainable development should be. TBL approach in area of tourism shows how tourism affects both the people who use its services and the people who work there, and to what extent the environment itself and the entire planet is influenced by tourism (Faux, 2005). One of the most challenging aspects of TBL implementing is its. This is associated with developing meaningful social, economic and environmental indicators. The greatest challenge of these is associated with attempting to quantify environmental and social impacts (see, for example Tyrrell et al., 2013; Skouloudis et al., 2009). There is a need to tailor these indicators for specific industry sectors, such as tourism industry, since tourists in different market segments can generate different environmental and social impacts on destinations (Dwyer, 2005). In addition, the term tourism industry contains organizations producing highly heterogeneous products (e.g., accommodations, food services, recreation and entertainment, transportation and travel). This heterogeneity of the tourism sector further complicates the development of universal social and environmental impact measures (e.g. Dwyer & Forsyth, 2008; Slaper & Hall, 2011; Mihalčová et al., 2014).

Despite these difficulties, a review of the existing literature reveals some early attempts to identify meaningful measures of sustainable tourism impact. WTO developed 11 destination-specific core indicators to measure sustainable tourism impact. Indicators include site protection, stress, use intensity, social impact, development control, waste management, planning process, critical ecosystems, consumer satisfaction, local satisfaction, and tourism contribution to the local economy. WTO indicators had been categorized into ecological indicators (site protection, stress, use intensity, waste management and critical ecosystems); social indicators (social impact, local satisfaction); economic indicators (consumer satisfaction and tourism contribution to the local economy); and planning indicators (development control and planning process) (Stoddard et al., 2012; Rogers & Ryan, 2001). The importance of these indicators varied by local authority type: regional councils preferred ecological indicators, territorial local authorities preferred economic indicators, and regional tourism organizations preferred both economic and social indicators. Generalized and global sustainable tourism guidelines could be successfully employed at a local level.

On the other hand, there is a difficulty of sustainable tourism scale development in four areas (Dymond, 1997). First, there is difficulty in differentiating between natural changes versus change that can be attributed to tourism activity. Secondly, tourism impact tends to be measured in one-year or five-year increments. But social or environmental changes take tens of years to manifest. Third, the choice of measures of tourism impact is often subjective in nature and may be based on popular recognition rather than utility. The present study represents the innovative approach to evaluation of sustainability in the hospitality industry. Innovation is made by hospitality sustainability index, with model offering exact categorization of each factor of Elkington 3P model (Elkington, 2004). The use of the model is done by applying multi-criterial decision utilizing AHP matrix. Proposed model of the research realizes that profit is also the pressure created on employee's productivity to deliver forecasted profit that needs to be reflected in the social aspect of the proposed model.

Development and use of the proposed model of sustainability in tourism could be an effective way how to create pressure on business units to satisfy all involved (Lee et al., 2010; Hughes, 2002). It means competitive environment asking for seeking the new ways of improvement and indicator assessing sustainable criteria. By this way model can become part of any free search engine and rating platform, as well as a governmental tool of control.

Due to the mentioned literature review the goal of the contribution is to evaluate sustainable development through triple bottom line in chosen tourism company in Slovakia – Hilton Hotels and Resorts. The choice of this type of tourism organization results from the global brand of full service of Hilton Hotels and Resorts, which presents flagship brand of multinational hospitality company in area of tourism sustainability.

2. Materials and Methods

In general, the most desirable outcome of the research is to find all criteria in perfect balance, when all pillars would be fully satisfied. It presents the index where People satisfaction (stakeholder, employees, and guests), shareholder under Profit pillar, and Planet protection (minimum waste and consumption of resources), would be in the ideal world with 100% satisfaction for each factor and each category, as shown in the following graph at Figure 1.
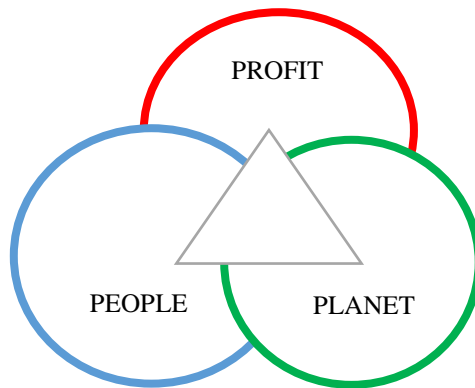
Fig. 1. HSI general model, graphical display of results in stage of Equilibrium for each category
Source: graph created in Inkscape software

Process of the research can be described by following steps illustrated Figure 2.

1. • Definition of data to be collected and measured, mainly measurement of water consumption, energy consumption and waste production.

2. • Data collection of this research started in 2015 on selected hospitality organization; different types of questionnaires were designed measuring as the guest satisfaction, so the team member satisfaction by online survey called SALT.

3. • Full data collection since 2015 became a platform for model definition and KPIs comparison and finally framed in 2018. Due to the paper extend we show results in 2018 in comparing with results from other years.

4. • Each type of data/factors falling under separate 3P model category, later entering the AHP matrix.

5. • In the second phase of this research, data from 2015 up to 2018 included revenues and profits and they have been processed into proposed sustainability model for the analysed organization by linear conversion.

6. • Third part of the research was defining AHP model as the result of calculation by use of entropy and weights given by an expert, or by end results of above described KPIs representing each of the measured P.

7. • The most desirable outcome is finding all criteria in perfect balance, in the equilibrium, where all pillars and its representatives, would be fully satisfied.

Fig. 2. Process of the research

Key performance indexes (KPIs) of environmental aspect were defined by hotel chains of the world. KPIs consist of the measurement of water consumption, energy consumption and waste production. We considered direct and indirect consumption of waste and water.

Data collection of the research started in 2015; different types of questionnaires were designed measuring the guest satisfaction and the team member satisfaction. The designed questionnaires were distributed by an online survey called SALT (Satisfaction and Loyalty tracker). Full data collection became a platform for model definition and KPIs comparison, and finally framed in 2018. Each data/factors fall under the separate 3P model category, later entering the AHP matrix, for specific definition of different hospitality sustainability indexes.

Entry data and factors defining the "People" category: "People" category data represent findings as people - the guests and people – employees' satisfaction. Guest's satisfaction data was directly gathered from SALT, and data for employee satisfaction from annual TMOS survey (Team Member Opinion Survey).

• Entry data and factors defining the "Planet" category: "Planet" category data represented collection of water and energy consumption and waste production. Due to the data processing we used Lightstay software on a monthly basis. Data were updated and monthly reports figures provided the source data for the proposed model.

• Entry data and factors defining the "Profit" category: When realizing the primary need to get back the investment with further profits, we obtained data on return on investment and other investors KPIs. Justifying profit as the only entry data for this research proposed a model of the hospitality sustainability index calculation would not be complete and correct.

Data from 2015 up to 2018 included revenues and profits. They have been processed into the proposed sustainability model for the analysed organization by linear conversion. That approach was also applied for water

consumption, energy consumption and waste production measures. Only the questionnaires from SALT and TMOS in form of percentage representing total satisfaction have been inserted directly into model for each factor.

Result of the calculation was defining analytic hierarchy process (AHP). It was done by entropy and weights given by experts (e. g. Saaty & Peniwati, 2008; Cingula et al., 2013; Saracoglu, 2013; Crouch & Ritchie, 2005). The next way was to use end results of KPIs representing measured P. The aim was to avoid any doubt of expert judgement choosing and defining weight for each factor. AHP was considered from different perspectives, when formulating the final index. Although the same data will be used, with potentially different weights assigned, results might differ accordingly. With intentionally changed weights of factors entering the AHP, different results might be desired for different user/evaluator/decision maker (Kim et al., 2017).

Therefore, the factors assigned for each category (P) were in calculation either assigned by weight provided by entropy, or by manually assigned weights (expert entries). Those different models served as a base model for the case study. Case study defined a weight of each factor of the model serving the hospitality sustainability index, judged by government/local municipality or client selecting, or employee selecting, employer etc.

To minimize potential manipulation of the model, entry data and weights are numbers (direct results of questionnaires representing, the direct opinion, direct measurement, figures evaluation of the factor). Weights are assigned directly by entropy. Due to the different potential users of Hospitality Sustainability Index (HSI) (represented in one number), the end result is not indicative enough for all parties. This would limit its wide use and ability to provide sufficient information for the decision makers. Based on the multi-criteria evaluation, evaluating the 3P, proposed general HIS index can naturally offer several modifications (weights amended = weight defined).

3. Results

The research results explain and calculate sustainability index in the chosen organization. Weights are calculated by entropy. Due to the contribution extend, we will illustrate results in 2018 (see Table 1.) and compare them with other results from research period.

Table 1. HIS general model, Entropy

3 P	Criteria	3P weights calculated by Entropy	Weights of factors calculated by Entropy	Year End results
People	Employee satisfaction	-	0.877177496	0.803
	Guest satisfaction	-	0.122822504	0.617
Planet	Energy consumption	0.385634353	0.187807589	0.716
	Water consumption	0.424854552	0.422975852	0.817
	Waste consumption	0.189511095	0.389216558	0.805
Profit	Revenues		0.937550464	0.709
	Profit	**HIS 79.611**	0.062449536	0.555

Source: processing in Inkscape software

HSI entropy 2018 with the 79.6 score was allocated with the highest weight - 42% to Planet category. People category with high satisfaction of Employee and Guest, has been given the 2nd highest weight of 38%. Profit is on an upper scale by entropy with weight of 19%, when analysing development from 2015-18 (as shown in Figure 3).
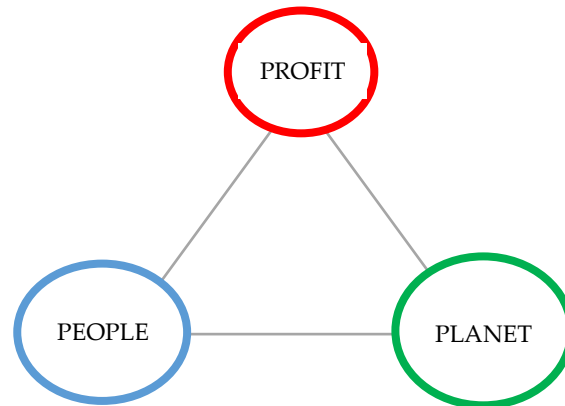
Fig. 3. HIS general model, Entropy, graphical display of results on the 3Ps triangle
Source: processing in Inkscape software

HSI general model from the view of equal weights is given by Table 2.

Table 2. HIS general model, Equal weights

3 P	Criteria	3P weights provided	Weights of factors provided equally	Year End results
People	Employee satisfaction	0.333333333	0.5	0.800
	Guest satisfaction		0.5	0.617
Planet	Energy consumption	0.333333333	0.333333333	0.716
	Water consumption		0.333333333	0.817
	Waste consumption		0.333333333	0.805
Profit	Revenues	0.333333333	0.5	0.709
	Profit	**HSI 70.7**	0.5	0.555

Source: processing in Inkscape software

HSI equal weights model in 2018 with result of 70.7 is in comparison with an entropy model figure lower by 8.46 points. Figure 4 compares the results from the view of entropy and equal weights.
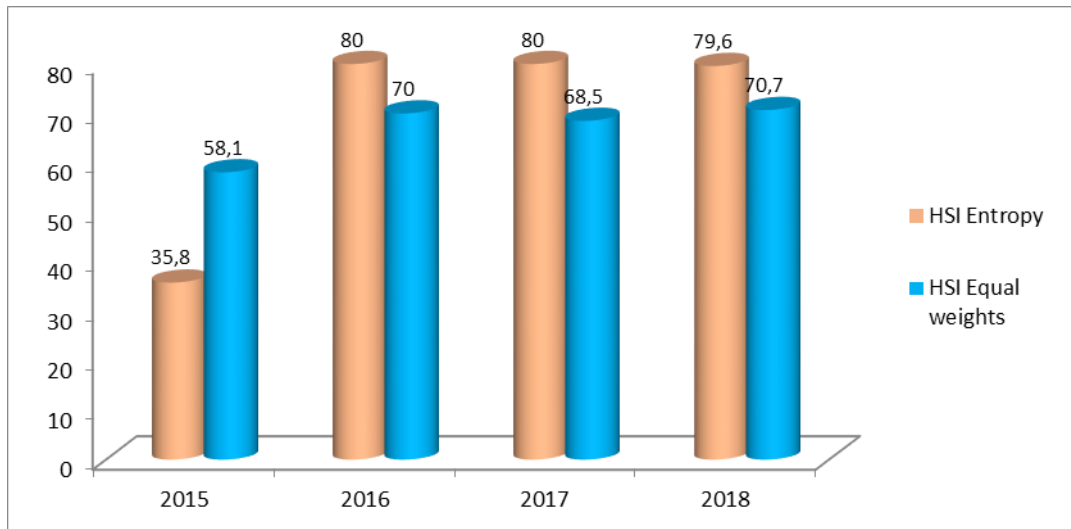
Fig. 4. HIS results – comparison of the Entropy vs. Equal weights allocation
Source: processing in Inkscape software

Almost in all cases method of entropy calculated for HSI higher result than when HSI was provided by calculation with equal weights. For this case, averagely Entropy scored +10 vs. method of equal weights. Only in 2015 equal weights was higher by 22.3 points.

Following are the predetermined HSI users benefiting from proposed basic HSI model:
1. People - as employees (selecting based on HSI their employer).
2. People - as guests (selecting hospitality organization to stay based on guest satisfaction).
3. Profit - as investor (selecting existing hospitality organization as investment).
4. Planet - as natural resources usage (government as regulator).

For calculation of HIS, benchmarking indexes were proposed. They serve as market differentiation and measuring tool for the users:
1. HSI Enviro – Environmental focus.
2. HSI Social – Social focus.
3. HSI Guest – Guest stay focus.
4. HIS Invest – Investment focus.

All indexes are illustrated by Figure 5.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:
@Entrepr69728810
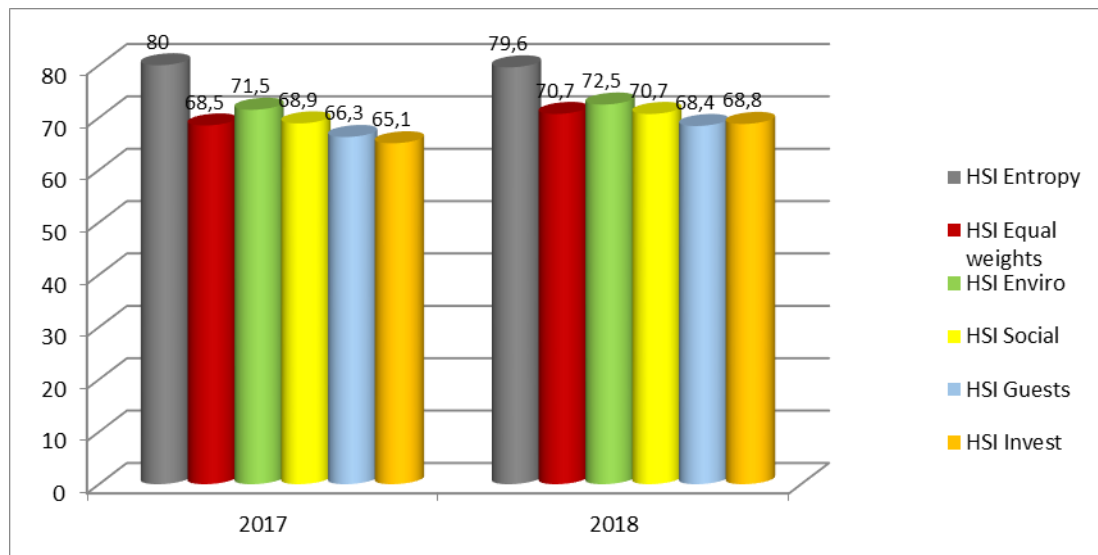
Fig. 5. HIS indexes – Overall performance comparison 2017-2018
Source: authors' calculations, see appendix for further details on data sources

In 2017 Entropy calculated the highest score for performance. It followed by the second HSI Equal weights method. In HSI model, the best performer was HSI Enviro with 71.5. The lowest was HSI Guest with 66.3. Performance in the analysed organization in 2018 received the highest evaluation in HSI Enviro score (72.5) and the worst rating was HSI Guest with 68.4. In general, four years of research measured by entropy, sustainability showed overall the highest scores. According to applied HSI focused indexes, performance varied slightly, but copied same trend in last three years.

4. Discussion, limitations and implications

The question that has to be addressed when considering TBL, is applying to tourism development projects. The question is whether synergies can be achieved between the development tourism organization and the community within which it operates. Dwyer (2005) provided many benefits, which may accrue to the organization of tourism development. Among these benefits belong – marketing, operational, strategy and relational benefits (Skouloudis et al., 2009). Operational benefits refer to cost savings and operating efficiencies. For the tourism organization, TBL can identify potential cost savings. It means enhanced design and operational efficiencies, recycling and waste reuse, reduced operating costs and transportation, etc. Result of the increased sensitivity of tourism organization toward its environmental and social impacts means a better understanding of organization contribution to sustainability. Also human resource costs can be reduced when employees are retained and attracted by an organization that focuses on sustainability. Finally, capital costs may be reduced when the organization has improved access to "ethical" and "green" investment funds.

From marketing perspective, tourism development organizations can benefit from adopting the approach of TBL through improved market positioning (McCool et al., 2001). The result of an improved market positioning can arise when its consumers become aware of the social and environmental sensitivity of the organization (Savitz & Weber, 2006). The adoption of TBL by tourism organizations could result in increased competitive differentiation. This in turn can facilitate the organization's ability to attract new markets as well as encourage

repeated visits. TBL might also benefit the tourism development organization via enhanced stakeholder relationships. TBL approach can improve organization of tourism sustainable development by proper strategic decision-making.

The results of HSI calculations mapped the history and evolving trend applied on the selected hospitality organization. Model with automatic entropy calculation and the model with the adjusted weights proved the different final result. But the joint index reflects how successful the sustainability of selected organization was. The index respects all three basic components or criteria and its representatives. Together with understanding and proven records, use and popularity of AHP model has been used as base of HSI calculation, experts' evaluation and expert judgment of weights. The research also concluded that the standardized approach to each factor data inputs must exist due to the correct results. Probably the biggest challenge in the past was how to unify measuring of water, energy, waste production in different hospitality types. Heating and cooling days are completely different in Africa, comparing with Northern Europe, etc. This demands long-term data collection, with aim to create industry standards. Profit and revenues are the only data that are well measured and standardized. The current challenge comes in aspect of Social pillar, measuring the guest and employee satisfaction in same way worldwide. The TBL helps the tourism industry to benefit from sustainability (Mousavi et al., 2017).

Conclusions

The research aimed to search possible using of existing evaluation of sustainability in hospitality area, where everyone would be happy by proposing hospitality sustainability index. Ability to sustain was firstly introduced as ecology, "the very expensive thing for hoteliers". Later it was defined as cost cutting, profit increasing technique. Big corporations, receiving the highest public pressure realize importance of all aspects of sustainability. Such corporations progress the most.

Novelty of the research brought model of calculation of the index measuring all 3Ps, helping to differentiate hospitality organizations. Hospitality sustainability index of competitive advantage was proposed to create further a competitive environment within the hospitality sector. Proposed HSI calculated with AHP method of entropy was compared with equal weights assigned model. All new HSI users need to understand that sustainability is generally accepted as component of 3P. They would probably judge differently and put different weight to a certain aspect of the model.

The results of the paper present contribution to the sustainable development of tourism from the view of preventive, environmental initiative, intended to minimize waste and maximize product output, as well as an increased contribution for all stakeholders, which is the goal of TBL approach as well. Although in this work we employ a hospitality organization model, the ideas can be extended to whole other types of organizations.

References

Agan, Y., Kuzey, C., Acar, M.F., & Acikgoz, A. 2016. The relationships between corporate social responsibility, environmental supplier development and firm performance. *Journal of Cleaner Production,* 112(3): 1872-1881. DOI: 10.1016/j.jclepro.2014.08.090

Antošová, M., & Csikósová, A. 2016. Corporate social responsibility in small and medium enterprises in Slovakia. *Actual Problems of Economics,* 175(1): 217-224.

Boley, B.B. 2011. Sustainability in hospitality and tourism education: Towards an integrated curriculum. *Journal of hospitality and tourism education,* 23(4): 22-31. DOI: 10.1080/10963758.2011.10697017

Butzmann, E., & Job, H. 2017. Developing a typology of sustainable protected area tourism products. *Journal of sustainable tourism,* 25(12): 1736-1755. DOI: 10.1080/09669582.2016.1206110

Cingula, D., Primorac, D., & Borovic, F. 2013. Categorization and offer in tourism using Analytic Hierarchy Process - AHP method. In *2nd International Scientific Conference on Economic and Social Development* (ESD), France, Paris, 5.4.2013, 122-129. Croatia: Varazdin development.

Crouch, G.I., & Ritchie, J.R.B. 2005. Application of the Analytic Hierarchy Process to tourism choice and decision making: A review and illustration applied to destination competitiveness. *Tourism analysis,* 10(1): 17-25. DOI: 10.3727/1083542054547930

Dainiené, R., & Dagilienė, L. 2015. A TBL approach based theoretical framework for measuring social innovations. In *Proceedings of the 20th International Scientific Conference Economics and Management*, ICEM 2015, Kaunas, Lithuania, May 06-08, 2015, 275-280. DOI: 10.1016/j.sbspro.2015.11.537

Dinica, V. 2018. The environmental sustainability of protected area tourism: towards a concession-related theory of regulation. *Journal of sustainable tourism,* 26(1): 146-164. DOI: 10.1080/09669582.2017.1322599

Dyllick, T., & Hockerts, K. 2002. Beyond the business case for corporate sustainability. *Busines Strategy and Environment,* 11(2): 130-141.

Dymond, S. 1997. Indicators of sustainable tourism in New Zealand: A local government perspective. *Journal of Sustainable Tourism,* 54: 279-293. doi.org/10.1080/09669589708667292

Dwyer, L., & Forsyth, P. 2008. Economic measures of tourism yield: What markets to target? *International Journal of Tourism Research,* 10(2): 155–168. DOI: 10.1002/jtr.648

Dwyer, L. 2005. Relevance of Triple Bottom Line reporting to achievement of sustainable tourism: A scoping study. *Tourism Review International*, 9(1): 79-93. DOI: 10.3727/154427205774791726

Elkington, J. 2004. Enter the triple bottom line. In *The Triple Bottom Line, Does It All Add Up? Assessing the Sustainability of Business and CSR,* 5th ed. A. Henriques and J. Richardson (Eds.), London: Earthscan Publications Ltd., 1-16.

Elkington, J. 1997. *Cannibals with Forks: The Triple Bottom Line of 21st Century Business*. Capstone: Oxford.

Faux, J. 2005. Theoretical and practical contexts of Triple Bottom Line performance and reporting: Implications for the tourism sector. *Tourism Review International,* 9(1): 95-105. DOI: 10.3727/154427205774791753

Fry, J., Lenzen, M., Jin, Y., Wakiyama, T., Baynes, T., Wiedmann, T., Malik, A., Chen, G., Wang, Y., Geschke, A., & Schandl, H. 2018. Assessing carbon footprints of cities under limited information. *Journal of cleaner production,* 176: 1254-1270. DOI: 10.1016/j.jclepro.2017.11.073

Global reporting initiative (GRI). 2002. Sustainability reporting guidelines on economic, environmental and social performance. Boston: GRI. Retrieved from http://www.gerenciamento.ufba.br/Downloads/gri_2002_guidelines.pdf

Ho, L-C.J., & Taylor, M.E. 2007. An empirical analysis of Triple Bottom Line reporting and its determinants: Evidence from the United States and Japan. *Journal of International Financial Management and Accounting,* 18(2): 123-150.

Hughes, G. 2002. Environmental indicators. *Annals of Tourism Research,* 29(2): 457-477. DOI: 10.1016/S0160-7383(01)00071-8

Jackson, A., Boswell, K., & Davis, D. 2011. Sustainability and Triple Bottom Line Reporting – What is it all about? *International Journal of Business, Humanities and Technology,* 1(3): 55-59.

Janošková, M., & Palaščáková, D. 2018. Corporate Social Responsibility as a strategic goal in business: A case study. In *Corporate Social Responsibility (CSR): Practices, Issues and Global Perspectives,* 1st ed. Ch. R. Baker, Eds., New York: Nova Science Publishers, 109-144.

Kang, K.H., Lee, S., & Huh, C. 2010. Impacts of positive and negative corporate social responsibility activities on company performance in the hospitality industry. *International journal of hospitality management,* 29(1): 72-82. DOI: 10.1016/j.ijhm.2009.05.006

Khan, H.R. 2017. Impacts of tourism activities on environment and sustainability of Pattaya beach in Thailand. *Journal of Environmental Management and Tourism*, 8(8): 1469-1473.

Kim, N., Park, J., & Choi, J.J. 2017. Perceptual differences in core competencies between tourism industry practitioners and students using Analytic Hierarchy Process (AHP). *Journal of Hospitality leisure sport & Tourism education,* 20: 76-86. DOI: 10.1016/j.jhlste.2017.04.003

Lee, J.S., Hsu, L.T., Han, H., & Kim, Y. 2010. Understanding how consumers view green hotels: how a hotel´s green image can influence behavioural intentions. *Journal of sustainable tourism,* 18(7): 901-914. DOI: 10.1080/09669581003777747

Lee, S., & Park, S.Y. 2009. Do socially responsible activities help hotels and casinos achieve their financial goals? *International Journal of Hospitality Management,* 28(1): 105-112. DOI: 10.1016/j.ijhm.2008.06.003

Lippman, E. 2010. Case study on sustainability: Accountant´s Role in developing a new business model. *AAA 2011 Management accounting section* (MAS). Meeting Paper. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1662648

Lozano-Oyola, M., Blancas, F.J., González, M., & Caballero, R. 2019. Sustainable tourism tags to reward destination management. *Journal of Environmental Management*, 250(15), No 109458. DOI: 10.1016/j.jenvman.2019.109458

Lynn, C. 2009. Corporate social responsibility in the hospitality industry. *Hosteur,* 18(2): 5-10.

McCool, S., Moisey, N., & Nickerson, N. 2001. What should tourism sustain? The disconnect with industry perceptions of useful Indicators. *Journal of Travel Research,* 40(2): 124-131.

Mihalčová, B., Antošová, M., & Csikósová, A. 2014. Tourism in the condition of small family firms of a selected region in Slovakia. In *17ᵗʰ International colloquium on regional sciences,* Czech Republic, Hustopeče, 849-856. Brno: Masaryk university, 2014. DOI: 10.5817/CZ.MUNI.P210-6840-2014-110

Mintz, S. 2011. Triple bottom line reporting for CPAs. *The CPA Journal*, 81(12): 26-33.

Mousavi, S.A., Hoskara, E., & Woosnam, K.M. 2017. Developing a model for sustainable hotels in Northern Cyprus. *Sustainability,* 9(11): art. no. 2101. DOI: 10.3390/su9112101

Pardo, C. 2018. Managing tourism development: a kit for action. *Worldwide Hospitality and Tourism Themes,* 10(6): 734-739. DOI: 10.1108/WHATT-07-2018-0051

Rogers, M., & Ryan, R. 2001. The triple bottom line for sustainable community development. *Local environment*, 6(3): 279-289.

Saaty, T. L., & Peniwati, K. 2008. *Group Decision Making: Drawing out and Reconciling Differences*. Pittsburgh: RWS Publications, Pennsylvania.

Saracoglu, B.O. 2013. Selecting industrial investment locations in master plans of countries. *European Journal of Industrial Engineering,* 7(4): 416-441. DOI: 10.1504/EJIE.2013.055016.

Savitz, A.W., & Weber, K. 2006. *The Triple Bottom Line: How Today's Best-Run Companies Are Achieving Economic, Social and Environmental Success - and How You Can Too.* San Francisco: Jossey-Bass.

Shou, Y., Shao, J., Lai, K.H., Kang, M., & Park, Y. 2019. The impact of sustainability and operations orientations on sustainable supply management and the triple bottom line. *Journal of Cleaner Production*, 240, art. no. 118280. DOI: 10.1016/j.jclepro.2019.118280

Sheldon, P., Knox, J.M., & Lowry, K. 2005. Sustainability in a mature mass tourism destination: the case of Hawai. *Tourism Review International,* 9(1): 47-59. DOI: 10.3727/154427205774791735

Skouloudis, A., Evangelinos, K., & Kourmousis, F. 2009. Development of an evaluation methodology for Triple Bottom Line reports using international standards on reporting. *Environmental Management,* 44(2): 298-311. DOI: 10.1007/s00267-009-9305-9

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Slaper, T.F., & Hall, T.J. 2011. The triple bottom line: What is it and how does it work? *Indiana Business Review,* 86(1): 4-8. Retrieved from https://www.ibrc.indiana.edu/ibr/ 2011/spring/article2.html

Stoddard, J.E., Pollard, C.E., & Evans, M.R. 2012. The Triple Bottom Line: A Framework for Sustainable Tourism Development. *International journal of Hospitality and Tourism administration,* 13(3): 233-258. DOI: 10.1080/15256480.2012.698173

Tyrrell, T., Paris, C.M., & Biaett, V.A. 2013. Quantified Triple Bottom Line for Tourism: Experimental Results. *Journal of Travel research,* 52(3): 279-293. DOI: 10.1177/0047287512465963

UNWTO. *UNWTO Annual Report 2014.* Retrieved from http://www2.unwto.org/ annualreport2014

Willard, B. 2002. *The Sustainability Advantage: Seven Business Case Benefits of a Triple Bottom Line*. Canada: New Society Publishers.

WTTC. *Economic Impact of Tourism.* Retrieved from https://www.wttc.org/research/ economic-research/ economic-impact-analysis/

Prof. Adriana CSIKÓSOVÁ works at Technical university of Košice, Slovakia She deals with the issues of economics, international business, marketing and market research. She was investigator of several projects in area of environmental and social aspect of social marketing, strategic management of the region, taking into account aspects of sustainable development in the region. The good orientation in this issue tells its publications and scientific research activity at home and abroad.
ORCID ID: 0000-0002-2370-9763, **WoS ResearcherID**: C-4625-2012

Assoc. prof. Mária JANOŠKOVÁ works at Department of Management in Poprad, Catholic University in Ružomberok, Slovakia. Her pedagogical and science activity are concentrated to Management of company, Strategic management, Human resources management, Business and Corporate Social Responsibility. In her scientific and research activity she deals with Human resources management with emphasize to knowledge management, problems of Corporate Social Responsibility in practice, as well as transfer of managerial knowledge to the business practice. She published some scientific monographs, chapters of monographs, articles in international journals, participated in International scientific conferences.
ORCID ID: 0000-0002-5975-753X, 5698-9874-900, **WoS ResearcherID:** U-6125-2017

Assoc. prof. Katarína ČULKOVÁ works at Institute of Earth Sources, Faculty BERG of Technical University of Košice, Slovakia. Her pedagogical and science activity is concentrated to financial analysis and financial management of industrial companies, as well as financial investment of organizations. In her scientific and research activity she deals with sustainable development from the view of financial management, resource policy of the state, and preparation of post-gradual students for the business in practice and at the job market. She published several scientific monographs, chapters of monographs, more than 50 articles in international journals, participated in several international scientific conferences.
ORCID ID: 0000-0002-5544-2872, **WoS ResearcherID**: E-7547-2012

THE SOCIAL AND LEGISLATIVE PRINCIPLES OF COUNTERACTING RANSOMWARE CRIME

Mafura Uandykova [1], Anton Lisin [2]*, Diana Stepanova [3], Laura Baitenova [4], Lyailya Mutaliyeva [5], Serhat Yuksel [6], Hasan Dincer [7]

[1,4]Narxoz Uniiversity, St. Zhandosova, 55, 050035, Almaty, Republic of Kazakhstan
[2]Financial University under the Government of the Russian Federation, 125167, Leningradsky Ave, 49, Moscow, Russian Federation
[3]Plekhanov Russian University of Economics, Stremyanny Lane 36, 117997, Moscow, Russian Federation
[5]L. N. Gumilyov Eurasian National University, Satpayev str. 2, 010008, Nur-Sultan, Republic of Kazakhstan
[6,7]Istanbul Medipol University, 34083, Istanbul, Turkey

[*1]E-mail: mrfoxv@list.ru (corresponding author)

Abstract. This article aims to analyze the relationship between the threat of ransomware and new effective counteraction principles for law enforcement agencies to utilize. Moreover, it contemplates on how specific behavior of persons can help reduce the threat of being infected with this malicious software. It establishes that certain changes made in society's mentality towards their computer and network systems can significantly reduce the consequent damages of ransomware attacks. The manuscript uses a qualitative research approach and the analysis of variance (ANOVA), including an F-test, which defines major challenges in ransomware. This is the first empirical research piece which uses this type of data and approach for the analysis of current threats in global ransomware security. The article suggests that the main challenge is the systematic growth of ransomware connected to illegal businesses and the inattentive actions of casual users. The research paper proposes the implementation of global ransomware counteraction principles on the base of challenges that are present now and the prospects of rising threats in the future. In addition, the manuscript analyzes the trends of the last 2-years of attacks to find and determine new ways of successfully counteracting it for optimal innovative regional development.

Keywords: organizational performance; cybercrimes; innovation; regional development; information; security awareness; ransomware; law

1. Introduction

The post-industrial era makes global digital technologies accessible and easy-to-use. Today's society is reliant on the internet, although the effects of this dependence is a common topic of debate. Information Technologies (IT) provide many services that contribute to making our everyday lives simpler and more organized.

However, availability of global digital technologies opens opportunities for individuals who are looking to take advantage of their vulnerabilities. Security breakdowns can lead to economic losses of innocent citizens, companies and even governments. Worse still, perpetrators can use computers and network systems to raise alarms, create panic in anticipation of violent ransomware attacks–and to coordinate and carry out terrorist acts. To great despair, counteraction of cybercrime has faced many problems, which have yet to be resolved (Zimba et al., 2018; Plėta et al., 2020).

One of the most effective ways of bypassing security protocols of computer systems and consequently infecting them is through ransomware. Ransomware is one of many categories of malicious software and affects masses of computers: ranging from family desktop PCs to corporate systems. Ransomware is described as a "kind of malware which demands a payment in exchange for a stolen functionality". Unfortunately, these ransomware attacks are prominent to this day and pose a significant threat.

Researchers have attributed the lack of an acute response to these crybercrimes to many factors. Among them is IT professionals' lack of understanding and interest in the phenomenon of cybercrime. Moreover, law enforcement officials lack the tools necessary to address the problem: old laws cannot conform with committed crimes. At the same time, new laws have very few judicial precedents that can be guided (Mercaldo et al., 2016).

As will be further discussed in the study, virtually everyone has the potential to counter cybercrime, especially ransomware. And if everyone is well-informed, attentive and careful, society in its entirety will have a better understanding of the principles of preventing these ransomware attacks. Of course, lots of changes will have to be made to achieve this (Kurpjuhn, 2019). But two groups specifically can increase their efforts to handle this problem and pave the way for countering this phenomenon (Chung, 2019; Al-rimy et al., 2018).

Another problem that should be emphasized is that everyone is talking about cybercrime despite not having an official definition of it (O'Kane et al., 2018).

2. Literature review

As cyberspace becomes more prominent in the modern world, it is evident that law enforcement agencies are not always able to keep up with its rates of growth. The scale at which IT has consumed the world has made systematicly and successfully committing cybercrimes possible. Because of this, networks of cyberfraud begin to nest in virtual space and harm individuals, governments, businesses. Responses to these actions should be strategical, tactical, and cooperative (Fagioli, 2019).

Cybercrime counteraction faces many problems. The general confusion surrounding the definition of cybercrime is an issue that needs to be addressed and resolved. A lack of professionals correctly determining the unique nature and threats of cybercrime could result in an array of complications which make counteracting it even harder.

There are many reasons justifying the development of a model definition of cybercrime specifically. A standardized perception of cybercrime across IT personnel, computer users, victims, police officers, detectives, prosecutors and judges will lead to the aforementioned unification of different social institutions, which, above all

else, is arguably the most important aspect of dealing with this lawlessness. Furthermore, the problem of insufficient and unreliable statistics could begin to be resolved if different participating branches use a single classification of cybercrime (Furnell and Emm, 2017; Genc et al., 2018).

Cybercrime definition should be unified not only among agencies, but among countries as well, due to the possibilities that cyberspace, the virtual space in which cybercrimes are committed, grants. This virtual world allows crimes to happen wherever. Thus, a mutual understanding of cybercrime across the globe is necessary to counteract this aspect of the problem (Kolodenker et al., 2017; Alwaelya et al., 2020; Yumashev and Mikhaylov, 2020; Yumashev et al., 2020).

Cybercrime definition would aid not only cooperation between agencies but also all parties individually. For example, IT professionals need a good definition of cybercrime to know when (and what) to report to authorities. At the same time, law enforcement needs a legislative definition of this type of crime to prosecute offenders, as laws must be defined in order to be enforceable (Pope, 2016).

Attempts to define cybercrime illustrate that it is a very generalized term. Practically speaking, these definitions are useless in almost any discussion, especially that which attempts to fully analyze cybercrime. This research paper now presents some noteworthy interpretations of cybercrime (Paquet-Clouston et al., 2019).

Many state-level and international organizations have attempted to give a working definition. The Council of Europe's Cybercrime Treaty's definition of cybercrime is broad, including such offences as criminal activity aimed at collecting or manipulating data and even copyright infringement. The United Nations Manual on the Prevention and Control of Computer Related Crime on the other hand, includes more misdemeanors, such as forgery, unauthorized access to computer systems and fraud. Symantec Corporation, which is a company specializing in computer security, gives the following definition of cybercrime: "any crime that is committed using a computer or network, or hardware device". At this point in the 21st century though, almost any action of any person in a First-world country utilizes the listed elements, so, perhaps, the line between a regular crime and cybercrime becomes too blurry.

Other studies and research papers are categorizing cybercrimes in order to come to a more cohesive conclusion. Gordon and Ford (2006) brought the idea of distinguishing Type I and Type II cybercrime based on the offences' characteristics, including whether or not the act was limited to computer systems exclusively (Covic and Voß, 2019; Mikhaylov and Tarakanov, 2020, Mikhaylov and Sokolinskaya, 2019).

Conversations and discussions on cybercrime in general can be extensive. However, this study focuses on one of the most common offences in cyberspace: ransomware. Ransomware, as has been already stated, is a type of malicicious software (Malware) which infects many Personal Computers. The infection, generally, can be in two forms. The first one completely locks out the user from accessing their system unless a ransom is paid. The other form restricts access to sensitive documents and information under the threat of deleting them unless the same condition is met. The size of the ransom can vary depending on the victim and situation, and criminals often demand the fee be payed in Bitcoin due to the privacy and lack of transparency that comes with cryptocurrency payements and transfers. Regardless, the general consensus is to not pay the ransom, as in doing so, the victim is proving the hackers' scheme to be profitable and they will continue to harm other systems. Moreover, no victim can be sure that the criminals will "hold up their end of the bargain" and actually unlock the system and/or files (Gonzales and Hayaineh, 2017; Zhang et al., 2019; Meynkhard, 2019; Lopatin, 2019; Lopatin, 2020; Denisova et al., 2019; Mikhaylov, 2018a; Mikhaylov, 2018b).

Although CryptoWall, which had become the leading version of ransomware in 2015, had great reputation for decrypting files after paying the fee, far from many other criminals and systems were as honest, which, of course,

is unsurprising. Because of this and many other reasons, involving the threat of more frequent ransomware attacks in the long term, the demanded sum of money had never been paid in over 3% of known cases (Richardson and North, 2017; Szlosarek et al., 2019; Covic and Voss, 2019; Dorantes-Argandar et al., 2019; Iliopoulou et al., 2019; Huang et al., 2019; Hadiuzzaman et al., 2019; Jasti et al., 2019).

Ransomware has been terrorizing persons' computer systems for over a decade now. The volume of these infections when the first ransomware ransomware attacks were made was initially low. Nevertheless, the rate at which ransomware spread increased over 500% in the year 2013 when compared to previous years. One of the many reasons that the number of ransomware attacks had increased exponentially was due to the fact that ransomware has shifted from infecting business network systems and computers to personal computers in households. It is noteworthy that these ransomware attacks are also more frightening, which is explained by the nature of household users to neglect backing up their files and using an effective antivirus that may prevent such happening in the first place (Connolly and Wall, 2019; Meynkhard, 2020b; Nyangarika et al., 2018; Nyangarika et al., 2019a, Meynkhard, 2020a; Nyangarika et al., 2019b).

Malware itself is accompanied by other viruses and worms, which harm computer systems and are a breach of security and privacy. One of the key issues relating to this subject is that programs meant to decrease victimization risk are not very effective. As of 2020, it is estimated that 33.28% of unprotected computer systems are infected with malware. Compare this to the 25% of PCs that are infected despite having anti-virus programs installed, and it would seem, as indicated by the relatively small spread between the figures, that these applications alone cannot prevent infections from happening. Moreover, criminology and IT are not capable of single-handedly counteracting this problem. It is an individual's responsibility to be familiar with the consequences of browsing suspicious and unsafe websites and change their behavior accordingly (An and Dorofeev, 2019; Brewer, 2016; Varyash et al., 2020; Moiseev et al., 2020; Nie et al., 2020).

Taking these facts into consideration, self-control is an important factor when analyzing victimization rates. It is a user's responsibility to be wary of visited websites and downloaded files. Low levels of self-control contribute to certain types of security breaches, data manipulation, and on-line harassment. Not only that, but these individual characteristics can be associated with minor cyberdeviance. These discoveries illustrate that individual characteristics and decisions are vital for safety in cyberspace but are not able to sufficiently provide a full line of security (Everett, 2016; Mohurle and Patil, 2017; Mikhaylov, 2019; Dayong et al., 2020; Denisova et al., 2019; Dooyum et al., 2020).

Among many cyberspace attacks, ransomware in particular is dependant and reliant on the behavior of the infected user – the victim. Ransomware attacks can be coordinated, targeting a specific system, e.g. a company's network of computers. However, these offences often happen due to a lack of attention from potential users – they "accidentally" get infected whilst visiting suspicious websites and downloading unsafe files. The behaviour of a user is presented not only by whether or not he has been infected, but also by his decision to pay the ransom or not. This is a key component in understanding and preventing ransomware attacks, because the decision to comply with hackers can give them incentive to keep their criminal spree going (Bhardwaj et al., 2016; Aurangzeb et al., 2017). This problem for IT-infrastucture of transport sector is researched (Chiabaut and Barcet, 2019; Nguyen et al., 2019; Bešinović and Goverde, 2019; Enayatollahi et al., 2019; Mohri and Akbarzadeh, 2019; Sun and Apland, 2019; Jevinger and Persson, 2019; Czioska et al., 2019; Heyken Soares et al., 2019; Habib and Hasnine, 2019; Malucelli and Tresoldi, 2019; Downward et al., 2019; Candelieri et al., 2019).

3. Materials and methods

A qualitative research approach is used in this study to reach its goals. Qualitative inquiries can be used for deep studying of ransomware crime like researchers before (Connolly and Wall, 2019). A focus group was created in order to be examined and analyzed. Our sample is made by persons who had rich experience with crypto-ransomware ransomware attacks.

Several measures were taken to verify the study's results and ensure reliability of the findings. Secondary data served as an important validator of discoveries. Moreover, the employment of a purposeful sampling technique prevented sampling distortion. The sample size itself was determined by the principle of theoretical saturation, equating to 30 interviewees.

Another key technique used in the study was asking respondents to provide feedback on interview transcripts and study findings and subsequently rationalizing them. The results of the survey were shared with an experienced researcher from TrendMicro, who provided important expert comments. All findings are supported by interviewees' quotes, providing additional verification. Finally, study informants showcased a high degree of unanimity about the necessary organizational measures needed to respond to the crypto-ransomware threat suggests that the results are reliable and will not change significantly if additional organizations were to be interviewed.

It is our belief that these precautions have eliminated most inaccuracies and misunderstandings from the data collection. Although we do not claim that the list of proposed measures is exhaustive, the utilization of the aforementioned principles ensures reliable results. As for the validity of findings, the situation is generally more complex. Interviews inevitably allow participants to answer questions in ways that distort facts. However, in this study, the situation appears to be unique. Participants had various incentives to provide factual answers. Although we do not claim that the study participants were entirely honest or forthcoming, several factors allow us to conclude that interviewees provided trust- worthy replies (Mikhaylov, 2020a; Mikhaylov, 2020b; Mikhaylov et al., 2020).

This conclusion can be made based on several reasonings. The majority of victims suffered greatly from crypto-ransomware attacks, including personal emotional distress as well as physical damage to IT infrastructure. The key incentive for participation in this study was to share their experiences with the aim to prevent future ransomware attacks on other organizations. Interviewees appeared to be genuinely concerned with the threat that these attacks present, including its recent proliferation and the consequences it may entail. Several respondents strongly disapproved the fact that many organizations are hiding active cyber-ransomware attacks. Moreover, several interviewees were appalled by the fact that criminals held them hostages and wanted to 'share their story' and warn others (Mikhaylov et al., 2019; Mikhaylov et al., 2018).

Almost all victims actively participated in validation exercises and expressed a keen interest in receiving final results and conclusions. As for Police Officers from the CCUs, the very nature of their job is to reduce cybercrime. Hence, they have a genuine interest in providing objective data. Our observation was that law enforcement representatives readily shared data on ransomware ransomware attacks, carefully concealing victims' identities. Other tactics that may have ensured honesty in informants included clearly communicated anonymity procedures, an option to change or delete parts of text in the transcripts (Sunchalin et al, 2019; Gura et al., 2020; Mikhaylov et al., 2020; Prosekov et al., 2020).

With respect to the respondents' confidentiality, aliases are used for the informants and ransom amounts are concealed, as the latter could otherwise be used to identify some of the interviewees (Table 1).

Table 1. Ransomware types and targets.

Organisation alias	Industry	Target
LawEnfJ	Law enforcement; small; public	Person
GovSecJN	Military; large; public	Person
GovSecJ	Military; large; public	Multiple ransomware attacks
EducInstF	Education; large; public	Computer
EducInstFB	Education; large; public	Computer
LawEnfM	Law enforcement; small	Multiple ransomware attacks
GovSecA	Military; large; public	Computer
LawEnfJU	Law enforcement; medium; public	Person
HealthSerJU	Health service; large; public	Multiple ransomware attacks
LawEnfF	Law enforcement; medium; public	Person
ITOrgA	IT; small; private	Computer
ConstrSupA	Construction; small; private	Computer
EducOrgA	Education; small; public	Computer
SecOrgM	IT; small; private	Person
ITOrgJL	IT; small; private	Computer
CloudProvJL	IT; small; private	Computer
InfOrgJL	Infrastructure; medium; private	Computer
ConstrSupJ	Construction; small; private	Computer
RelOrgJ	Religion; medium; private	Person
SportClubJ	Sport; large; private	Computer
UtilOrgD	Utilities; large; private	Computer

Source: authors

The data was used between January and December 2018. The interview questions are as follows:

Can you please describe the experience of the ransomware incident?
What made you understand that a ransomware ransomware attack took place?
What was the source of the ransomware?
In your opinion, why was the ransomware effective in infecting the network?
Does your organization have ransomware policies and provide specific training?
Does your organization backup its files and electronic documents?
Does your organization utilize antivirus software?
Does your organization have cybersecurity insurance that overs ransomware?
What did you learn from this experience?
What changes have been made in the organization following the ransomware attack?
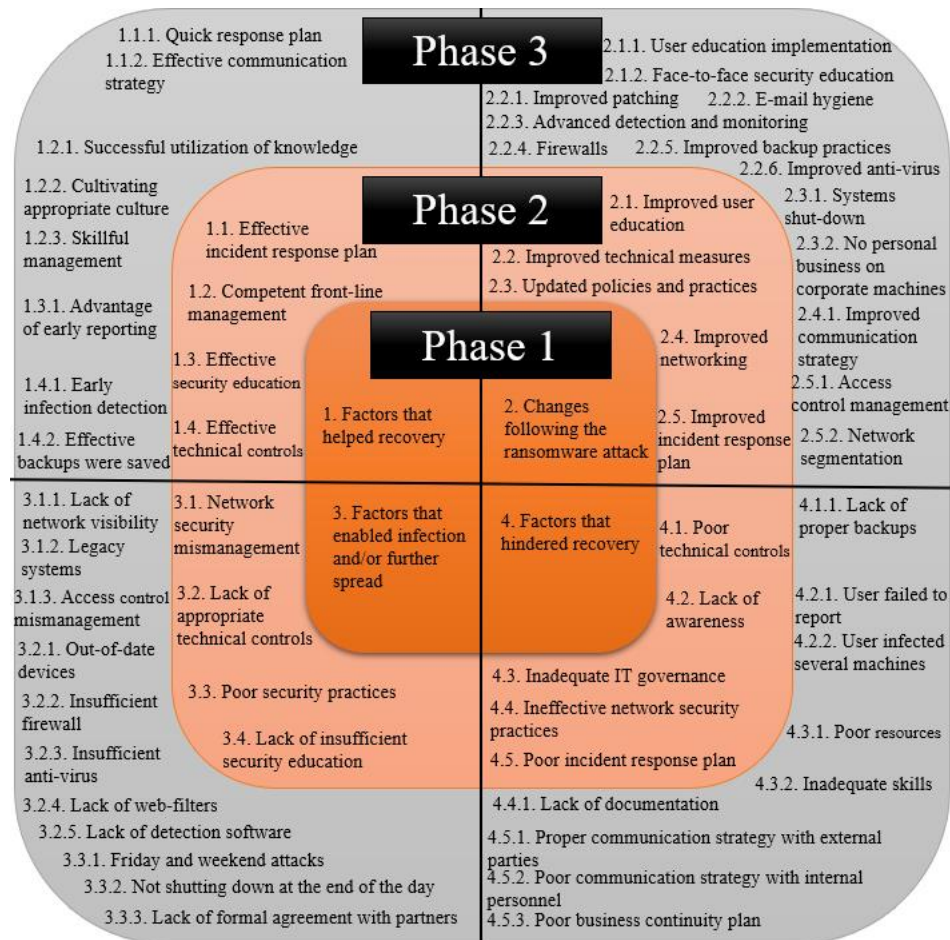
Fig. 1. The phases of analysis
Source: authors

The research targeted the speacilists' reaction during the cybercrime incidents and has 3 phases of analysis (Fig. 1). The paper classifies answers and obtained results of the ransomware attacks. The ransomware attack time horizon is from the years of 2014 until 2018. These ransomware attacks were structured by the types of crypto-ransomware. The aim is to find a balance between using specific humans or machine systems as initial targets. (Ivanyuk and Soloviev, 2019; Ivanyuk, 2018; Radosteva et al., 2018; Elizarov et al., 2017).

Furthermore, statistics on e-mail spam and phishing rates (Appendix) are used to confirm the thesis that they are both correlated in infecting computer systems with ransomware. It is noteworthy that the analysis of variance (ANOVA) in particular is used in order to find possible discrepencies and differences between the cases. The tables are used as samples and the discovery of variance. Whilst related methods, such as the *t-test are* similar, and can also be used, the decision to use the ANOVA specifically was made due to familiarity of the authors with it (An et al., 2019a; An et al., 2019b; An et al., 2019c; An et al., 2020a; An et al., 2020b; An et al., 2020c).

4. Results

As we have already reviewed, the behavior of people is incredibly important in situations regarding the prevention of infections in cyberspace and the successful reolvement of problems which may arise. The interview that was conducted is meant to understand what methods organizations utilize to keep their data and systems safe.

The collected data shows that over half of victims are able to retrieve lost data using backups. This method, as described by the interviewees themselves, allowed them to avoid some damage caused by the attack, whilst simultaneously not succumbing to the criminals' demands. This has proven to be incredibly effective.

An aspect that had been vital to understanding the scale and consequences of ransomware infections is insurance. Figure 1 presents data on countries with cybersecurity insurance and contrasting insurance which covers ransomware attacks in 2019. This data directly parallels with the study's first stage of analysis titled "Factors that helped recovery" and the subsequent stages.
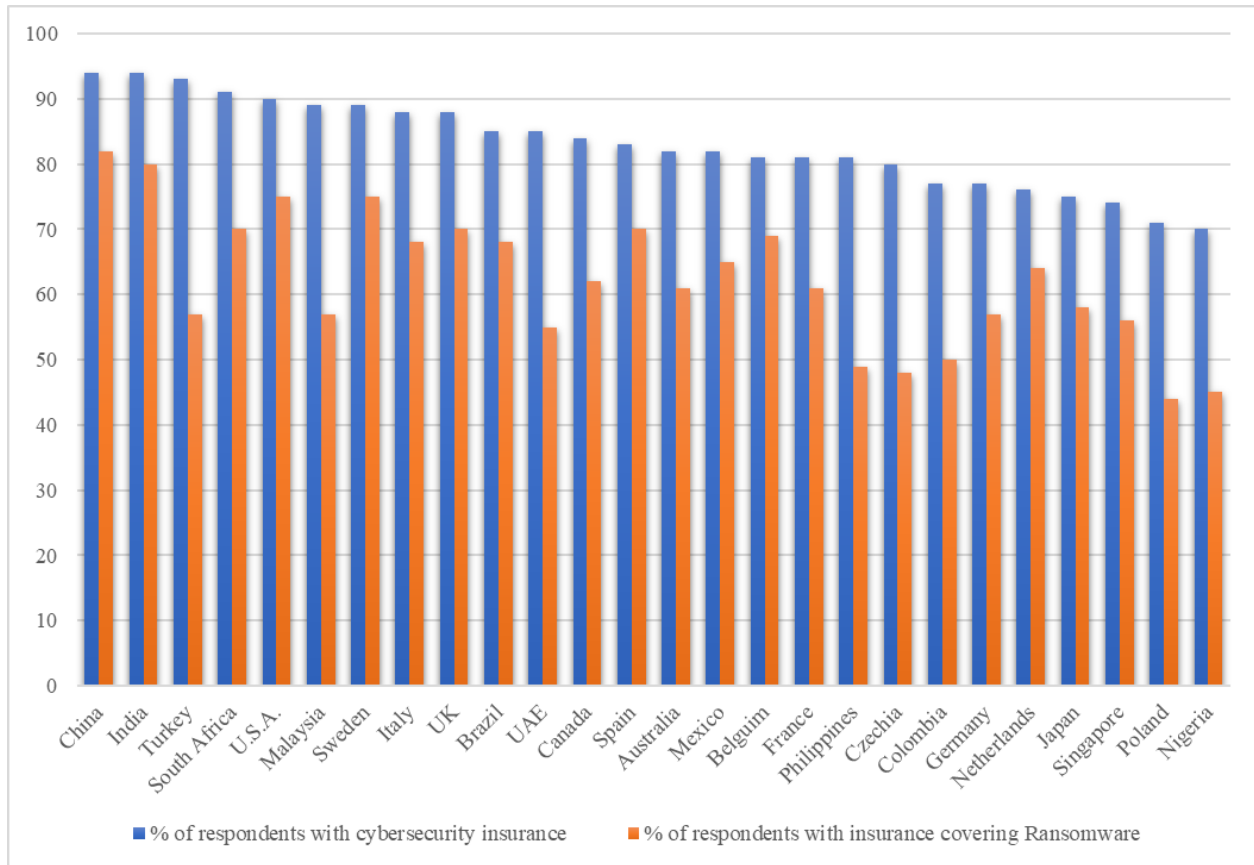
Fig. 2. Cybersecurity insurance by country in 2019.
Source: Sophos

As evident by the Figure, the choice of obtaining insurance that covers ransomware is inconsistent among the examined countries. Some countries decide to "go the extra mile" and also protect themselves from Ransomware. In order to understand the reason behind some countries' organizations valuing ransomware insurance more than others, the study observes the states in which ransomware attacks are more frequent (Figure 3).
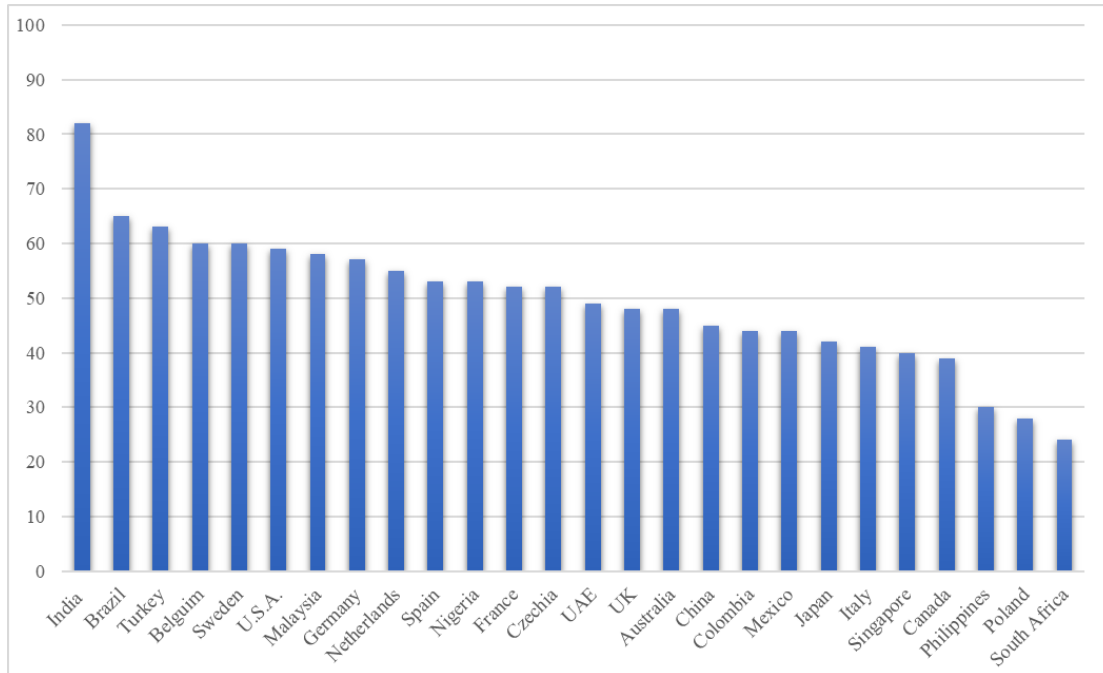
Fig. 3. Percentage of organizations hit by ransomware in 2019.
Source: Sophos

As you can see, India has been targetted most often, which explains the neccessity to buy not only cybersecurity insurance, but also that which protects from ransomware. Of curse, this may lead to subsequent problems, which is based on the ransom being paid (Figure 4).
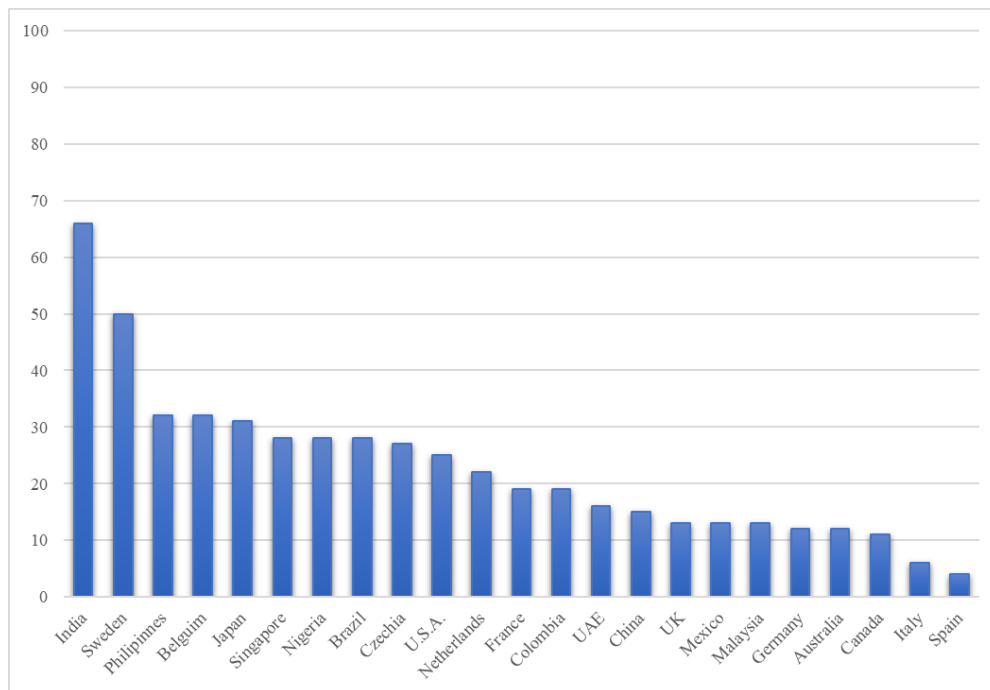
Fig. 4. Percentage of organizations that paid the ransomware in 2019.
Source: Sophos

It is not surprising that the country with the most intense insurance-policy pays the ransom far more often than many other states. This method of dealing with ransomware, as stated by our interviewees, proves to be effective, as almost every organization that was attacked by ransomware and paid the fee had the ransom paid by insurance. Subsequently, this often resulted in data and systems being unlocked.

The sums of money paid should also be put in perspective. The figure 5 below shows the average fee among ransomware infections contrasted with one of the most expensive types of ransomware – Ryuk. The key takeaway from this graph is that this volume of money ends up in the hands of criminals, that may use these new resources to continue harming other computer systems.
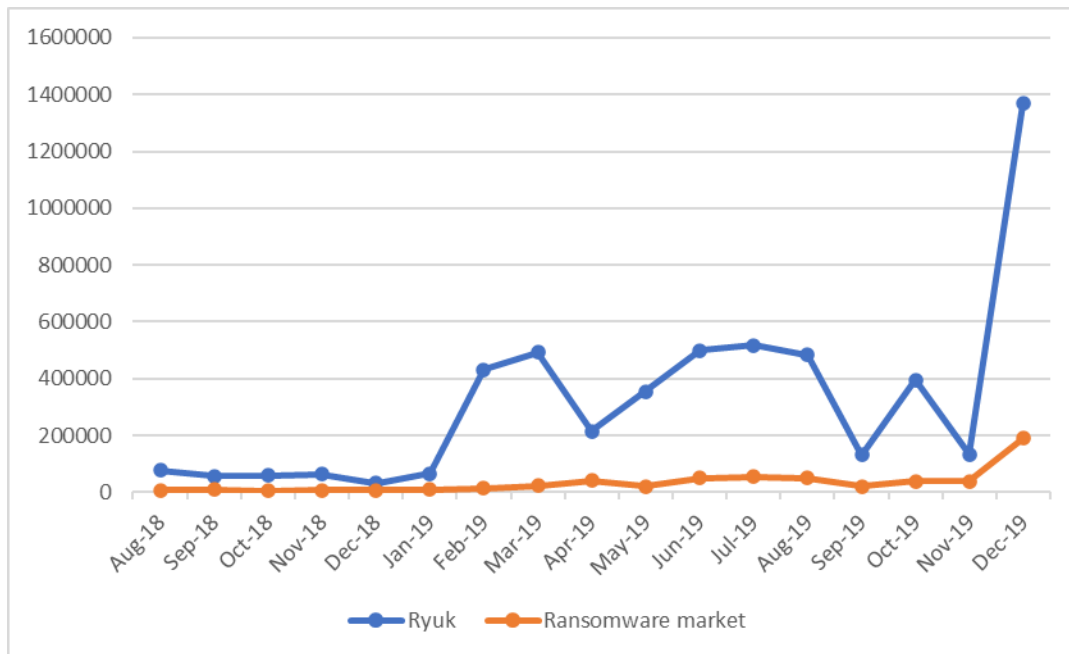
Fig. 5. Ransomware fee. Ryuk average fee and Ransomware average fee (USD$).
Source: Sophos

Regarding the ANOVA test, a strong correlation (F=10019) was found between email spam rate and email phishing rate (Table 2). These methods are both common, and thus users should be informed about the possible dangers of both methods in which hackers can take advantage of vulnerebilities in their systems. These results also parallel with the results of our interview, where most infections were said to happen through e-mail messengers.

Table 2. ANOVA summary

	Data Summary		
	Samples		
	1	2	Total
N	45	45	90
$-\sum X$	2455.3	2.5451	2457.8451

-Mean	54.5622	0.0566	27.3094
- $\sum X^2$	134553.45	0.3952	134553.8452
Variance	13.3369	0.0057	757.6584
Std.Dev.	3.652	0.0756	27.5256
Std.Err.	0.5444	0.0113	2.9015
standard weighted-means analysis			
ANOVA Summary Independent Samples k=2			

Source	SS	Df	MS	F	P
Treatment [between groups]	66844.518	1	66844.518	10019.67	<.0001
Error	587.077	88	6.6713		

Source: authors

5. Discussion

Commercial companies have given employees short seminars about these problems. There are programs for theoretical studies and practical experiences of law enforcement in big cities (Malecki, 2019; Yaqoob et al., 2017).

In rural areas and provinces, only a few law enforcements officers have specialized training in computer crime investigation. But this situation is slowly improving. Crime scene patrol officers are some of the most trained individuals in this area of expertise. They are first to produce and store (or destroy and approve the destruction of) valuable digital evidence. Ideally, all members of the justice system should receive basic information technology education and, better yet, the level of training that these officers have. However, this goal cannot be achieved in a short time period, but requires revamping the system of guides that are followed by officials (Mansfield-Devine, 2016).

As for the results of scientific methods used: businesses in particular are interested in ensuring the security of their data, documents and files, as the damages can be overwhelming. This has led to the development of different plans meant to resolve possible issues. Among them, as we have noted, is insurance along side file backup. Insurance is a form of "temporary solution", as the criminals are still able to gain their desired resources. Backups on the other hand, do not resolve the issue of "bricked" hardware, as it allows to replace previous systems with newer. However, this has the potential to save a business large funds compared to insurance or plainly paying the ransom. Moreover, insurance-paid ransom is not guaranteed to be unlocked – backups are more reliable in this situation.

This brings us to arguably the most important point of the study – preventing ransomware attacks from happening in the first place. This is obviously the most beneficial situation, but it requires training and increased attention from users – a change in their behavior in cyberspace in general.

Users are capable to prevent thousands of dollars in damages if they simply add discipline, control, awareness to their browsing and Internet-surfing experience. This is the exact reason many organizations that have faced ransomware attacks intensify their programs to educate employees – as they, individuals, are also responsible for vulnerability exploitation (Ye et al., 2016).

6. Conclusion

Nowadays, very few organizations, governments and persons work and function without the use of gadgets, IT devices, computer systems. Because technology has integrated in to our lives as much as it has, it becomes progressively more important to invest in making cyberspace safe.

The study has reviewed how different methods of resolving the attack impacts the spread of ransomware across the Internet – be it insurance policy, backups or simply paying the ransom. Furthermore, the possible gateways to infection have been analyzed and examined. A strong connection between e-mail spam and phishing has been found, which reinforces these two methods of infection as one of the most common – making them essential to be learned in group seminars and courses about safety in cyberspace.

The research paper has also drawn results from interviewing persons with first-hand experience of facing ransomware attacks. These attacks emphasize vulnerabilities in the organization's computer system and can lead to permanent damage and file-loss. In the aftermath of the attack, organizations' and persons' weak spots are put on display, and they begin to take cybersecurity in a more serious manner, as it is an urgent manner – no one can know if they will be attacked today, tomorrow or in a month.

Despite paying much attention to ways that ransomware can be dealth with, this study values prevention tactics the most: making sure that infections do not occur in the first place. There are

This study, just as any other, has its limitations. For example, there are other common ways users can get infected with unwanted virii, such as visiting suspicious websites and downloading hazardous files and documents. these methods were reviewed, but were not researched in further detail. Furthermore, mobile users have been facing the issues of ransomware infections at an increasing alarming rate. This type of virus has become more common on gadgets and this should be a topic for future extensive research. There are numerous studies discussing machine learning methods of detecting ransomware, which is a topic that can be successfully utilizied by big corporations as well as governments.

7. Contribution to the body of knowledge

This paper summarizes the literature review on the growing problem of ransomware attacks across the world. The principals of infection have also been discussed and analyzed. Furthermore, the article emphasizes the causes and sources of users' vulnerability. It has evaluated that the industry of Information Technology has potential to become safer not only through means of regulation, but also by changing the mentality that people have when browsing the internet. The research paper has reported on actions to prevent the spread of ransomware can and should be done by all social institutions: governments, organizations and households. Governments have numerous levers to not only detect attacks and resolve issues, but bring criminals to justice. The state has a monopoly on this, as no other institution, be it a business or individual person, can "get revenge" for the damages. In order to do this, laws must be passed to build a legislative base for counteracting cybercrime and punishments

for misdemeanors. Furthermore, governments have the opportunity to cooperate on and international level to ensure a level playing field all over the globe.

References:

Al-rimy, B. A. S., Maarof, M. A., Shaid, S. Z. M. (2018). Ransomware threat success factors, taxonomy, and countermeasures: A survey and research directions. − Computers & Security 74: 144-166. https://doi.org/10.1016/j.cose.2018.01.001

Alwaelya, S.A., Yousif N.B.A., Mikhaylov A. (2020). Emotional Development in Preschoolers and Socialization. Early child development and care, 190(6). https://doi.org/10.1080/03004430.2020.1717480

An, J., Dorofeev, M. (2019). Short-term FX forecasting: decision making on the base of expert polls. Investment Management and Financial Innovations, 16(4), 72-85. https://doi.org/10.21511/imfi.16(4).2019.07

An, J., Dorofeev, M., Zhu, S. (2020c). Development of Energy Cooperation Between Russia and China. International Journal of Energy Economics and Policy, 10(1), 134-139.

An, J., Mikhaylov, A., Jung, S.-U. (2020b). The Strategy of South Korea in the Global Oil Market. Energies, 13(10), 2491; https://doi.org/10.3390/en13102491

An, J., Mikhaylov, A., Kim, K. (2020a). Machine Learning Approach in Heterogeneous Group of Algorithms for Transport Safety-Critical System. Applied Sciences, 10(8), 2670; https://doi.org/10.3390/app10082670

An, J., Mikhaylov, A., Moiseev, N. (2019c). Oil Price Predictors: Machine Learning Approach. International Journal of Energy Economics and Policy, 9(5), 1-6. https://doi.org/10.32479/ijeep.7597

An, J., Mikhaylov, A., Sokolinskaya, N. (2019a). Machine learning in economic planning: ensembles of algorithms. Journal of Physics: Conference Series, 1353, 012126 https://doi.org/10.1088/1742-6596/1353/1/012126

An, J., Mikhaylov, A., Sokolinskaya, N. (2019b). Oil incomes spending in sovereign fund of Norway (GPFG). Investment Management and Financial Innovations, 16(3), 10-17. https://doi.org/10.21511/imfi.16(3).2019.02

Aurangzeb, S., Aleem, M., Iqbal, M. A., Islam, M. A. (2017). Ransomware: a survey and trends. Computer Fraud & Security, 6(2), 48-58. https://doi.org/10.1016/S1361-3723(17)30089-1

Bešinović, N., Goverde, R.M.P. (2019), Stable and robust train routing in station areas with balanced infrastructure capacity occupation. Public Transport, 11(2), 211-236. https://doi.org/10.1007/s12469-019-00202-3

Bhardwaj, A., Avasthi, V., Sastry, H., Subrahmanyam, G. V. B. (2016). Ransomware digital extortion: a rising new age threat. Indian Journal of Science and Technology 9(14), 1-5. https://www.researchgate.net/profile/Hanumat_Sastry/publication/286301708_Ransomware_A_Rising_Threat_of_new_age_Digital_Extortion/links/5763ae5908ae9964a16badd0/Ransomware-A-Rising-Threat-of-new-age-Digital-Extortion

Brewer, R. (2016). Ransomware attacks: detection, prevention and cure. Network Security, 2016(9), 5-9. dhttps://doi.org/10.1016/S1353-4858(16)30086-1

Candelieri, A., Galuzzi, B.G., Giordani, I., Archetti, F. (2019), Vulnerability of public transportation networks against directed attacks and cascading failures. Public Transport, 11(1), 27-49. https://doi.org/10.1007/s12469-018-00193-7

Chiabaut, N., Barcet, A. (2019). Demonstration and evaluation of an intermittent bus lane strategy. Public Transport, 11(3), 443-456. https://doi.org/10.1007/s12469-019-00210-3

Chung, M. (2019). Why employees matter in the fight against ransomware. Computer Fraud & Security 2019(8), 8-11. https://doi.org/10.1016/S1361-3723(19)30084-3

Connolly, L. Y., Wall, D. S. (2019). The rise of crypto-ransomware in a changing cybercrime landscape: Taxonomising countermeasures. Computers & Security 87: 101568. https://doi.org/10.1016/j.cose.2019.101568

Covic, F., Voß, S. (2019), Interoperable smart card data management in public mass transit. Public Transport, 11(3), 523-548. https://doi.org/10.1007/s12469-019-00216-x

Czioska, P., Kutadinata, R., Trifunović, A., Winter, S., Sester, M., Friedrich, B. (2019), Real-world meeting points for shared demand-responsive transportation systems. Public Transport, 11(2), 341-377. https://doi.org/10.1007/s12469-019-00207-y

Dayong, N, Mikhaylov, A, Bratanovsky, S, Shaikh, Z.A., Stepanova, D. (2020). Mathematical modeling of the technological processes of catering products production. Journal of Food Process Engineering, 43(2). https://doi.org/10.1111/jfpe.13340

Denisova, V., Mikhaylov, A., Lopatin, E. (2019). Blockchain Infrastructure and Growth of Global Power Consumption. International Journal of Energy Economics and Policy, 9(4), 22-29. https://doi.org/10.32479/ijeep.7685

Dooyum, U.D., Mikhaylov, A., Varyash, I. (2020). Energy Security Concept in Russia and South Korea. International Journal of Energy Economics and Policy, 10(4), 102-107. https://doi.org/10.32479/ijeep.9116

Dorantes-Argandar, G., Rivera-Vázquez, E.Y., Cárdenas-Espinoza, K.M. (2019), Measuring situations that stress public bus users in Mexico: a case study of Cuernavaca, Morelos. Public Transport, 11(3), 577-587. https://doi.org/10.1007/s12469-019-00215-y

Downward, A., Chowdhury, S., Jayalath, C. (2019), An investigation of route-choice in integrated public transport networks by risk-averse users. Public Transport, 11(1), 89-110. https://doi.org/10.1007/s12469-019-00194-0

Elizarov, M., Ivanyuk, V., Soloviev, V., Tsvirkun, A. (2017). Identification of high-frequency traders using fuzzy logic methods. Proceedings of 2017 10th International Conference Management of Large-Scale System Development, MLSD 2017. https://doi.org/10.1109/MLSD.2017.8109615

Enayatollahi, F., Idris, A.O., Atashgah, M.A.A. (2019), Modelling bus bunching under variable transit demand using cellular automata. Public Transport, 11(2), 269-298. https://doi.org/10.1007/s12469-019-00203-2

Everett, C. (2016). Ransomware: to pay or not to pay?.Computer Fraud & Security 2016(4), 8-12. https://doi.org/10.1016/S1361-3723(16)30036-7

Fagioli, A. (2019). Zero-day recovery: the key to mitigating the ransomware threat. Computer Fraud & Security 2019(1), 6-9. https://doi.org/10.1016/S1361-3723(19)30006-5

Furnell, S., Emm, D. (2017). The ABC of ransomware protection. Computer Fraud & Security 2017(10): 5-11. https://doi.org/10.1016/S1361-3723(17)30089-1

Genç, Z. A., Lenzini, G., Ryan, P. Y. (2018). Next generation cryptographic ransomware. Nordic Conference on Secure IT Systems 385-401. http://158.64.76.181/bitstream/10993/37569/1/next_gen_rw.pdf

Gonzalez, D., Hayajneh, T. (2017). Detection and prevention of crypto-ransomware. 2017 IEEE 8th Annual Ubiquitous Computing, Electronics and Mobile Communication Conference (UEMCON) 472-478. https://doi.org/10.1109/UEMCON.2017.8249052

Gordon, S., Ford, R. (2006). On the definition and classification of cybercrime. Journal in Computer Virology, 2(1), 13-20. https://doi.org/10.1007/s11416-006-0015-z

Gura, D., Mikhaylov, A., Glushkov, S., Zaikov, M., Shaikh Z.A. (2020). Model for estimating power dissipation along the interconnect length in single on-chip topology. Evolutionary Intelligence. https://doi.org/10.1007/s12065-020-00407-7

Habib, K.N., Hasnine, S. (2019), An econometric investigation of the influence of transit passes on transit users' behavior in Toronto. Public Transport, 11(1), 111-133. https://doi.org/10.1007/s12469-019-00195-z

Hadiuzzaman, M., Malik, D.M.G., Barua, S., Qiu, T.Z., Kim, A. (2019), Modeling passengers' perceptions of intercity train service quality for regular and special days. Public Transport, 11(3), 549-576. https://doi.org/10.1007/s12469-019-00213-0

Heyken Soares, P., Mumford, C.L., Amponsah, K., Mao, Y. (2019), An adaptive scaled network for public transport route optimization. Public Transport, 11(2), 379-412. https://doi.org/10.1007/s12469-019-00208-x

Huang, W., Shuai, B., Antwi, E. (2019), A two-stage optimization approach for subscription bus services network design: the China case. Public Transport, 11(3), 589-616. https://doi.org/10.1007/s12469-018-0182-6

Iliopoulou, C., Kepaptsoglou, K., Vlahogianni, E. (2019). Metaheuristics for the transit route network design problem: a review and comparative analysis. Public Transport, 11(3), 487-521. https://doi.org/10.1007/s12469-019-00211-2

ISTR (2019). Internet Security Threat Report, Volume 24, February 2019 http://book.itep.ru/depository/security/surveys/ISTR_24_2019_en.pdf.

Ivanyuk, V. (2018).Econometric Forecasting Models Based on Forecast Combination Methods. Proceedings of 2018 11th International Conference Management of Large-Scale System Development, MLSD 2018. https://doi.org/10.1109/MLSD.2018.8551825

Ivanyuk, V., Soloviev, V. (2019). Efficiency of neural networks in forecasting problems. Proceedings of 2019 12th International Conference Management of Large-Scale System Development; MLSD 2019. https://doi.org/10.1109/MLSD.2019.8911046

Jasti, P.C., Ram, V.V. (2019), Sustainable benchmarking of a public transport system using analytic hierarchy process and fuzzy logic: a case study of Hyderabad, India. Public Transport, 11(3), 457-485. https://doi.org/10.1007/s12469-019-00219-8

Jevinger, Å., Persson, J.A. (2019), Exploring the potential of using real-time traveler data in public transport disturbance management. Public Transport, 11(2), 413-441. https://doi.org/10.1007/s12469-019-00209-w

Kolodenker, E., Koch, W., Stringhini, G., Egele, M. (2017). Paybreak: Defense against cryptographic ransomware. − Proceedings of the 2017 ACM on Asia Conference on Computer and Communications Security 599-611. http://dx:doi.org/10:1145/3052973:3053035

Kurpjuhn, T. (2019). The guide to ransomware: how businesses can manage the evolving threat. Computer Fraud & Security 2019(11), 14-16. https://doi.org/10.1016/S1361-3723(19)30117-4

Lopatin, E. (2019). Assessment of Russian banking system performance and sustainability. Banks and Bank Systems, 14(3), 202-211. https://doi.org/10.21511/bbs.14(3).2019.17

Lopatin, E. (2020). Cost of Heating Pump Systems in Russia. International Journal of Energy Economics and Policy, 10(3). https://doi.org/10.32479/ijeep.9056

Malecki, F. (2019). Best practices for preventing and recovering from a ransomware attack. Computer Fraud & Security 2019(3), 8-10. https://doi.org/10.1016/S1361-3723(19)30028-4

Malucelli, F., Tresoldi, E. (2019), Delay and disruption management in local public transportation via real-time vehicle and crew re-scheduling: a case study. Public Transport, 11(1). https://doi.org/10.1007/s12469-019-00196-y

Mansfield-Devine, S. (2016). Ransomware: taking businesses hostage. − Network Security 2016(10), 8-17. https://doi.org/10.1016/S1353-4858(16)30096-4

Mercaldo, F., Nardone, V., Santone, A. (2016). Ransomware inside out. − In 2016 11th International Conference on Availability, Reliability and Security (ARES) 628-637. https://doi.org10.1109/ARES.2016.35

Meynkhard, A. (2019). Energy Efficient Development Model for Regions of the Russian Federation: Evidence of Crypto Mining. International Journal of Energy Economics and Policy, 9(4), 16-21. https://doi.org/10.32479/ijeep.7759

Meynkhard, A. (2020a). Long-term prospects for the development energy complex of Russia. International Journal of Energy Economics and Policy, 10(3), c. 224-232.

Meynkhard, A. (2020b). Priorities of Russian Energy Policy in Russian-Chinese Relations. International Journal of Energy Economics and Policy, 10(1), 65-71. https://doi.org/10.32479/ijeep.8507

Mikhaylov A, Tarakanov, S. (2020). Development of Levenberg-Marquardt theoretical approach for electric network. Journal of Physics: Conference Series, 1515, 052006 https://doi.org/10.1088/1742-6596/1515/5/052006

Mikhaylov A., Danish M.S.S., Senjyu T. (2020). New stage in evolution of cryptocurrency market: analysis by Hurst method. In S. Yuksel and H. Dincer (Ed.), Strategic Outlook in Business and Finance Innovation: Multidimensional Policies for Emerging Economies (pp. 14-16). London, United Kingdom: Emerald.

Mikhaylov, A, Sokolinskaya, N. (2019). Russian banks after sanctions of 2014. Orbis, 15(44), 55-65. http://www.revistaorbis.org.ve/pdf/44/art5.pdf

Mikhaylov, A. (2018a). Pricing in Oil Market and Using Probit Model for Analysis of Stock Market Effects. International Journal of Energy Economics and Policy, 8(2), 69-73. https://www.econjournals.com/index.php/ijeep/article/view/5846

Mikhaylov, A. (2018b). Volatility Spillover Effect between Stock and Exchange Rate in Oil Exporting Countries. International Journal of Energy Economics and Policy, 8(3), 321-326. https://www.econjournals.com/index.php/ijeep/article/view/6307

Mikhaylov, A. (2019). Oil and Gas Budget Revenues in Russia after Crisis in 2015. International Journal of Energy Economics and Policy, 9(2), 375-380. https://doi.org/10.32479/ijeep.6635

Mikhaylov, A. (2020a). Geothermal Energy Development in Iceland. International Journal of Energy Economics and Policy, 2020, 10(4), 31-35. https://doi.org/10.32479/ijeep.9047

Mikhaylov, A. (2020b). Lichens as indicators of atmospheric pollution in urban ecosystems. Israel Journal of Ecology & Evolution, 10016, 1-9. http://dx.doi.org/10.1163/22244662-bja10016

Mikhaylov, A., Moiseev, N., Aleshin, K., Burkhardt, T. (2020). Global climate change and greenhouse effect. Entrepreneurship and Sustainability Issues, 7(4), 2897-2913. http://doi.org/10.9770/jesi.2020.7.4(21)

Mikhaylov, A., Sokolinskay, N., Lopatin, E. (2019). Asset allocation in equity, fixed-income and cryptocurrency on the base of individual risk sentiment. Investment Management and Financial Innovations, 16(2), 171-181. https://doi.org/10.21511/imfi.16(2).2019.15

Mikhaylov, A., Sokolinskaya, N., Nyangarika, A. (2018) Optimal Carry Trade Strategy Based on Currencies of Energy and Developed Economies. Journal of Reviews on Global Economics, 7, 582-592. https://doi.org/10.6000/1929-7092.2018.07.54

Mohri, S.S., Akbarzadeh, M. (2019), Locating key stations of a metro network using bi-objective programming: discrete and continuous demand mode. Public Transport, 11(2), 321-340. https://doi.org/10.1007/s12469-019-00205-0

Mohurle, S., Patil, M. (2017). A brief study of wannacry threat: Ransomware attack 2017. – International Journal of Advanced Research in Computer Science 8(5). https://sbgsmedia.in/2018/05/10/2261f190e292ad93d6887198d7050dec.pdf

Moiseev, N., Mikhaylov, A., Varyash, I., Saqib, A. (2020). Investigating the relation of GDP per capita and corruption index. Entrepreneurship and Sustainability Issues, 8(1), 780-794. http://doi.org/10.9770/jesi.2020.8.1(52)

Nguyen, P., Diab, E., Shalaby, A. (2019), Understanding the factors that influence the probability and time to streetcar bunching incidents. Public Transport, 11(2), 299-320. https://doi.org/10.1007/s12469-019-00201-4

Nie, D., Panfilova, E., Samusenkov, V., Mikhaylov, A. (2020) E-Learning Financing Models in Russia for Sustainable Development. Sustainability, 12(11), 4412. https://doi.org/10.3390/su12114412

Nyangarika, A., Mikhaylov, A., Richter, U. (2019b). Oil Price Factors: Forecasting on the Base of Modified Auto-regressive Integrated Moving Average Model. International Journal of Energy Economics and Policy, 9(1), 149-160. https://doi.org/10.32479/ijeep.6812

Nyangarika, A., Mikhaylov, A., Tang, B.-J. (2018). Correlation of Oil Prices and Gross Domestic Product in Oil Producing Countries. International Journal of Energy Economics and Policy, 8(5), 42-48. Retrieved from https://www.econjournals.com/index.php/ijeep/article/view/6802

Nyangarika, A., Mikhaylov, A., Richter, U. (2019a). Influence Oil Price towards Economic Indicators in Russia. International Journal of Energy Economics and Policy, 9(1), 123-129. https://doi.org/10.32479/ijeep.7597

O'Kane, P., Sezer, S., Carlin, D. (2018). Evolution of ransomware. − IET Networks 7(5): 321-327. https://doi.org/10.1049/iet-net.2017.0207

Paquet-Clouston, M., Haslhofer, B., Dupont, B. (2019). Ransomware payments in the bitcoin ecosystem. Journal of Cybersecurity 5(1). https://doi.org/10.1093/cybsec/tyz003

Plėta, T., Tvaronavičienė, M., Della Casa, S., Agafonov, K. (2020). Cyber-attacks to critical energy infrastructure and management issues: overview of selected cases. Insights into Regional Development, 2(3), 703-715. https://doi.org/10.9770/IRD.2020.2.3(7)

Pope, J. (2016). Ransomware: minimizing the risks. − Innovations in clinical neuroscience 13(11-12), 37. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5300711/

Prosekov S., Danish M.S.S., Senjyu T. (2020). Long-Term Memory Models for Predicting Dynamics of Cryptocurrencies. In S. Yuksel and H. Dincer (Ed.), Strategic Outlook in Business and Finance Innovation: Multidimensional Policies for Emerging Economies (pp. 24-34). London, United Kingdom: Emerald.

Radosteva, M., Soloviev, V., Ivanyuk, V., Tsvirkun, A.(2018). Use of neural network models in market risk management. Advances in Systems Science and Applications, 18(2), 53-58. https://doi.org/10.25728/assa.2018.18.2.582

Sun, B., Apland, J. (2019), Operational planning of public transit with economic and environmental goals: application to the Minneapolis–St. Paul bus system. Public Transport, 11(2), 237-267. https://doi.org/10.1007/s12469-019-00199-9

Sunchalin, A.M., Kochkarov, R.A., Levchenko, K.G., Kochkarov, A.A., Ivanyuk, V.A. (2019). Methods of risk management in portfolio theory. Espacios, 40(16), 8 p.

Szlosarek, R., Yan, C., Kröger, M., Nußbaumer, C. (2019), Energy efficiency of ropeways: a model-based analysis. Public Transport, 11(3), 617-635. https://doi.org/10.1007/s12469-019-00212-1

Varyash, I., Mikhaylov, A., Moiseev, N., Aleshin, K. (2020). Triple bottom line and corporate social responsibility performance indicators for Russian companies. Entrepreneurship and Sustainability Issues, 8(1), 313-331. http://doi.org/10.9770/jesi.2020.8.1(22

Yaqoob, I., Ahmed, E., ur Rehman, M. H., Ahmed, A. I. A., Al-garadi, M. A., Imran, M., Guizani, M. (2017). The rise of ransomware and emerging security challenges in the Internet of Things. Computer Networks 129, 444-458. https://doi.org/10.1016/j.comnet.2017.09.003

Ye, H., Dai, W., Huang, X. (2016). U.S. Patent No. 9,317,686. Washington, DC: U.S. Patent and Trademark Office. https://patentimages.storage.googleapis.com/2b/e0/d3/7ac0a4bd166bff/US9317686.pdf

Yumashev, A., Ślusarczyk, B., Kondrashev, S., Mikhaylov, A. (2020). Global Indicators of Sustainable Development: Evaluation of the Influence of the Human Development Index on Consumption and Quality of Energy. Energies, 13, 2768. https://doi.org/10.3390/en1311276

Yumashev, A., Mikhaylov, A. (2020) Development of Polymer Film Coatings with High Adhesion to Steel Alloys and High Wear Resistance. Polymer Composites, 41(7), 2875-2880. https://doi.org/10.1002/pc.25583

Zhang, H., Xiao, X., Mercaldo, F., Ni, S., Martinelli, F., Sangaiah, A. K. (2019). Classification of ransomware families with machine learning based on N-gram of opcodes. Future Generation Computer Systems, 90, 211-221. https://doi.org/10.1016/j.future.2018.07.052

Zimba, A., Wang, Z., Chen, H. (2018). Multi-stage crypto ransomware attacks: A new emerging cyber threat to critical infrastructure and industrial control systems. Ict Express, 4(1), 14-18. https://doi.org/10.1016/j.icte.2017.12.007

Appendix

Answer classification of analysis' phases.

1.1.1.1 we responded methodically	3.1.3.7 scanning vulnerable IPs on Internet is simple
1.1.1.2 processes were documented in the incident response plan	3.1.3.8 vulnerable Internet facing servers
	3.1.3.2 we voluntary enabled RDP
1.1.2.1 we handled media invasion very well	3.1.3.3 RDP brute-force due to weak password
1.1.2.2 we were able to inform staff immediately	3.1.3.4 RDP system is not brilliant
1.2.1.1 breach coach helped enormously with recovery	3.1.3.5 Microsoft ignored our RDP concerns
1.2.1.2 cyber insurance provided information we needed	3.1.4.1 escalated privileges
1.2.1.3 cyber insurance reimbursed many expenses	3.1.4.2 poor management of admin passwords

1.2.1.4 security vendor was helpful
1.2.1.5 cyber experts are needed to find patient zero
1.2.1.6 IT contractors worked very hard
1.2.1.7 IT contractor decrypted scrambled data
1.2.1.8 internal staff is the key to successful recovery
1.2.2.1 timely reporting led to fast reaction to the threat
1.2.2.2 it is important to let people know what is happening
1.2.2.3 people were compassionate and determined
1.2.2.4 despite of challenging conditions, people were amazing
1.2.3.1 security-savvy IT manager
1.2.3.2 knowing what to expect helps
1.2.3.3 prior experience with ransomware attacks helps
1.3.1.1 early reporting gave us advantage of time
1.4.1.1 we had sophisticate detection software
1.4.1.2 anti-virus was up-to-date
1.4.2.1 we frequently test backups
1.4.2.2 our offline backups saved us
2.2.1.1 centrally-managed vulnerability management
2.2.1.2 scheduled vulnerability management
2.2.1.3 removing Flash
2.2.1.4 business applications update
2.2.2.1 blocking certain attachments and links
2.2.2.2 email identification
2.2.2.3 malicious code analysis platform
2.2.3.1 centrally-controlled upgrades
2.2.3.2 upgrading legacy systems
2.2.3.3 OS upgrade
2.2.4.1 implementation of detection system
2.2.4.2 monitoring software
2.2.5.1 advanced protection firewall
2.2.5.2 securely-configured firewall
2.2.6.1 testing backups
2.2.6.2 offline backups
2.2.7.1 higher protection anti-virus
2.4.1.1 considering loss of IT
2.4.1.2 informing staff via text messages
2.5.1.1 applications roles and responsibilities
2.5.1.2 least privileges approach
2.5.2.1 retiring old machines
2.5.5.1 disabling RDP
2.5.5.2 robust VPN to replace RDP
3.1.1.1 we do not know who connects to network
3.1.1.2 we do not know amount of ransom notes received
3.1.1.3 no control over upgrading/updating OS
3.1.1.4 it was like a fog when we got infected
3.1.2.1 legacy systems could not be upgraded
3.1.2.2 legacy systems could not be retired
3.1.3.1 we do not know who connects via RDP
3.1.3.6 RDP enabled by default

3.1.4.3 infected domain controller
3.1.4.4 disregard for proper network structures
3.1.4.5 root access
3.2.1.1 ransomware came in via vulnerable server
3.2.1.2 some of our servers were very old
3.2.1.3 out-of-date software
3.2.1.4 SMB vulnerability
3.2.1.5 out-of-date Flash
3.2.2.1 low-level protection firewall
3.2.3.1 new malware signature
3.2.3.2 out-of-date anti-virus
3.2.3.3 drive-by-download
3.2.4.1 infection came through browsing Internet
3.2.5.1 ransomware stayed undetectable for days
3.3.5.1 signs 'please do not turn computer on'
3.3.5.2 Friday ransomware attacks
3.4.1.1 aging employee
3.4.1.2 apathy
3.4.1.3 you are as vulnerable as your least savvy user
3.4.1.4 convincing email
3.4.1.5 well-crafted email
3.4.1.6 it starts with user
4.1.1.1 a lot of critical systems did not have backups
4.1.1.2 Time Machine was encrypted
4.1.1.3 backups got deleted by ransomware
4.1.1.4 backups were not particularly clever
4.1.1.5 insufficient backups forced us to pay
4.1.1.6 servers were not affected, only desktops and laptops
4..1.1.7 backup software was only grabbing chunks of files
4.1.1.8 sensitive information was encrypted
4.1.1.9 too many nodes got encrypted
4.1.1.10 IT provider failed to ensure efficient backups
4.1.1.11 networked backups
4.3.1.1 lack of proper funding
4.3.1.2 IT team is absolutely tiny
4.3.1.3 too many servers for such small IT team
4.3.2.1 inappropriate background leading to poor governance
4.3.2.2 senior management incompetence led to further infections
4.3.2.3 not understanding the importance of IT
4.3.2.4 senior management should have been more involved
4.3.2.5 underappreciation of IT
4.5.1.1 phone calls from other organisation caused disruption
4.5.1.2 media invasion
4.5.1.3 security vendors invasion
4.5.2.1 we did not realise email will be down
4.5.2.2 we did not have mobile phones of senior management
4.5.2.3 no one thought of IT resources being unavailable
4.5.3.1 we did not know how to do both investigation and recovery

Source: author

Ransomware mail spam rate by country.

Email spam	%
Saudi Arabia	66,8
China	62,2

Brazil	60,8
Sri Lanka	60,6
Norway	59,1
Oman	58,6
Sweden	58,3
Mexico	58,1
UAE	58,1
USA	57,5
Colombia	56,8
Belgium	56,2
Serbia	55,8
Singapore	55,4
UK	54,8
Germany	54,8
Taiwan	54,5
Austria	54,4
Finland	54,4
Hungary	54,4
Greece	54,2
Israel	54,1
Denmark	54,1
France	54
Netherlands	53,9
Australia	53,9
New Zealand	53,4
Canada	53,4
Italy	53,4
Poland	53,2
Spain	52,9
Qatar	52,6
South Korea	52,4
Portugal	52,1
Luxembourg	51,4
Malaysia	51,4
Thailand	51,1
Ireland	51
India	50,9
South Africa	50,8

Switzerland	50,8
Hong Kong	50,5
Papua New Guinea	50
Philippines	49,5
Japan	48,7

Source: ISTR (2019).

Ransomware mail phishing rate by country.

Email spam	%
Saudi Arabia	66,8
China	62,2
Brazil	60,8
Sri Lanka	60,6
Norway	59,1
Oman	58,6
Sweden	58,3
Mexico	58,1
UAE	58,1
USA	57,5
Colombia	56,8
Belgium	56,2
Serbia	55,8
Singapore	55,4
UK	54,8
Germany	54,8
Taiwan	54,5
Austria	54,4
Finland	54,4
Hungary	54,4
Greece	54,2
Israel	54,1
Denmark	54,1
France	54
Netherlands	53,9
Australia	53,9
New Zealand	53,4
Canada	53,4
Italy	53,4
Poland	53,2

Spain	52,9
Qatar	52,6
South Korea	52,4
Portugal	52,1
Luxembourg	51,4
Malaysia	51,4
Thailand	51,1
Ireland	51
India	50,9
South Afrika	50,8
Switzerland	50,8
Hong Kong	50,5
Papua New Guinea	50
Philippines	49,5
Japan	48,7

Source: ISTR (2019).

Mafura UANDYKOVA is currently Accociate Professor at Narxoz University, Kazakhstan. She is an author of 3 scientific publications and conference papers indexed in SCOPUS and Web of Science. She has extensive research work addressing challenging in System modeling in the development of a model of scenario control of the regional innovative development level. Her Research Interest Areas: Business, Management and Accounting Decision Sciences Economics, Econometrics and Finance Agricultural and Biological Sciences Computer Science Veterinary.
ORCID ID: https://orcid.org/0000-0001-5229-335X

Anton LISIN is Laboratory assistant of the Department of Financial Markets and Banks (2019) in the Financial University under the Government of the Russian Federation. He is the author of several articles that have been published by journals indexed in SCOPUS, addressing topics, such as economic relations, policy and energy potential. Main scientific interests are: energy, resource conservation, region, energy-efficient development, energy indicators, modeling, forecasting, strategic planning, independence of network operation.
ORCID ID: https://orcid.org/0000-0002-8708-132X

Diana STEPANOVA is Associate Professor of the Department of Finance and Prices, a leading researcher at the Plekhanov Russian University of Economics, Moscow, Russia. She is the author of more than 50 scientific papers and conference materials indexed in Russian and international scientific databases (more than 20 SCOPUS and WoS articles in total) on problems of Economics and Finance both at the macro level and at the level of individual industries and companies. She teaches the cources: Finance, Global financial markets, Foreign exchange market, Company credit policy, International finance, International financial market, Pricing, Financial markets and financial instruments, International pricing.
ORCID ID: https://orcid.org/0000-0001-5981-6889

Laura BAITENOVA is currently Accociate Professor at Narxoz University, Kazakhstan. She is an author of sevaral scientific publications and conference papers indexed in SCOPUS and Web of Science. She has extensive research work addressing challenging in analysis and forecast of the main trends of world economy, foreign sector of the Russian economy; analysis of the country's balance of payments; competitiveness of the national economy; macroeconomic forecasting. Her Research Interest Areas: Business, Management and Accounting Decision Sciences Economics, Econometrics and Finance Agricultural and Biological Sciences Computer Science Veterinary.
ORCID ID: https://orcid.org/0000-0002-1591-2235

Lyailya MUTALIYEVA is currently Accociate Professor at L. N. Gumilyov Eurasian National University, Kazakhstan. She is an author of sevaral scientific publications and conference papers indexed in SCOPUS and Web of Science. She has extensive research work addressing challenging in analysis and forecast of the main trends of world economy, foreign sector of the Russian economy; analysis of the country's balance of payments; competitiveness of the national economy; macroeconomic forecasting. Her Research Interest Areas: Business, Management and Accounting Decision Sciences Economics, Econometrics and Finance Agricultural and Biological Sciences Computer Science Veterinary.
ORCID ID: https://orcid.org/0000-0002-9681-1515

Serhat YUKSEL is currently an Associate Professor at Istanbul Medipol University, Turkey. He is an author of 53 scientific publications and conference papers indexed in SCOPUS and Web of Science and author of several scientific monographs. He has extensive research work addressing challenging in the Field of Econometric Modeling, Climate Policy & Climate Change, Energy, and Finance. His Research Interest Areas: energy efficiency, renewable energy investment projects, energy policy, energy economics, energy consumption, fuzzy logic, multi-criteria decision-making models.
ORCID ID: https://orcid.org/0000-0002-9858-1266

Hasan DINCER is currently Full Professor at Istanbul Medipol University, Turkey. He is an author of more than 100 scientific publications and conference papers indexed in SCOPUS and Web of Science. He has extensive research work addressing challenging in the Field of Econometric Modeling, Climate Policy & Climate Change, Energy, and Finance. His Research Interest Areas: energy efficiency, renewable energy investment projects, energy policy, energy economics, energy consumption, fuzzy logic, multi-criteria decision-making models, regional economics, macroeconomic stability, economic equality, energy policy, renewable energy investment projects.
ORCID ID: https://orcid.org/0000-0002-8072-031X

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

AFTER COVID-19. REORIENTATION OF CRISIS MANAGEMENT IN CRISIS[*]

Zbyslaw Dobrowolski

Jagiellonian University, Institute of Public Affairs, ul. Prof. S. Lojasiewicza 4, 30-348 Krakow, Poland

E-mails: zbyslaw.dobrowolski@uj.edu.pl

Abstract. The occurrence of the COVID-19 Pandemic has revealed all the weaknesses of different organisations, including macrostructures – the States. It turned out that they are unprepared to COVID-19 Pandemic and at the same time pretending that they are controlling unpredictability, which is not valid. I collect information through a review of secondary data and observation of pandemic effects in several countries. In all countries, the effects of a pandemic are noticeable. It creates the slowdown of the economy and the introduction of restrictions on public life on an unprecedented scale. The effects of current economic restrictions will appear in a few months. I identified weaknesses in the crisis response and argue that any organisations also in macro-level should redefine the role of crisis management, which is in crisis. There is a need for a co-evolving this system within the organisation, which means the necessity of reshaping crisis management from crisis management relational model into crisis management three-dimensional flexible model. Crisis management based on risk analysis may be useless in the context of organisational unpredictability.

Keywords: Pandemic; unpredictability; crisis management; forecasting; foresight

1. Introduction

COVID-19 pandemic revealed weakness in organisations and macrostructures in different scale in all of the World. It is sufficient evidence that crisis management has failed. The effects of unpredictable pandemic are significant. They are breaking supply chains, hindering business operations, results in loss of trust and reputation. Most countries have severe problems with ensuring essential health and economic security for their citizens and residents.

There are many studies on crisis management (c.f., Mansfeld, 1999; Okike, 2004; Ghosh, Ostry, & Qureshi, 2015; Besenyő, & Kármán, 2020). However, there is little know why crisis management is flawed, which is proved by systematically recurring crises and the last one initiated by COVID-19. I aim to fill this research gap and formulate the following research problem, whether crisis management relational approach based on risk management is appropriate in conditions of unpredictability?

The paper proceeds as follows: First, I review previous research on crisis management, and formulate methodology. Next, I build a new model of crisis management. After that, I formulate conclusions and identify an area of future research.

2. Theoretical Framework

2.1. Nature of crisis and crisis response

Literature study showed that the nature of the crisis and its responses are multifaceted. Following Smith view, there is no collective acceptance about the precise meaning of the term "crisis" (Smith, 2005, p. 319). However, Jaques (2010) noticed that a descriptive definition developed by Pearson and Clair (1998) is appropriate: "An organisational crisis is a high impact event that threatens the viability of the organisation and is characterised by ambiguity of cause, effect and means of resolution, as well as by a belief that decisions must be made swiftly" (p. 60). This definition should be changed. An organisational crisis is indeed a high impact event that threatens the viability of the organisation. However, causes of the crisis can be known or should be determined, but they have not been established because the organisation has neglected potential threats. Therefore, an organisational crisis is a high impact event that threatens the viability of the organisation and is caused by neglect observation of potential threats, their effects and means of resolution.

Müller (1985) noticed that in a crisis, it is highly unlikely that problems will be solved at a single stroke or by ad-hoc action. It leads to the assumption that despite the urgency of the crisis, the situation demands management and solving-problems from a three-dimensional perspective, which includes organisational, managerial and political issues. One may add to this perspective, another one, an axiological dimension. Moral weaknesses in organisations may catalyse a crisis, but also cause such ethical crises (Boling, 1978; Dobrowolski, 2017). Paraskevas (2006) using narrative analysis identified weaknesses in the chain's crisis response. Kouzmin (2008) noticed, that crisis management can be unable to decrease escalating crisis in increasingly risk-dominated economies. His statement needs to be fulfilled.

Crisis management proved to be useless in a pandemic. Johansen, Aggerholm and Frandsen (2012) presented and discussed some of the main findings from a broad survey of internal crisis management and crisis communication conducted in 2011 among the 367 largest Danish private companies and 98 public organisations (municipalities). The study showed that the vast majority of analysed organisations had a crisis or contingency plans. However, the questions: how do they implement these plans, and what are the effects of the crisis management were without answers. Surely, such a response is possible in the crisis, which means ex-post. I argue that it is too late to obtain such a solution. There is a need to verify the accuracy od such plans and effectiveness of problem-solving ex-ante. Therefore, organisations should not only prepare crisis or contingency plan but also measures of verification these plans. Preble (1997) notes the fields of strategic management and crisis management have been evolving separately despite their potential for synergistic integration. This author shows how the combination of crisis management's approach to strategic management's offensive market positioning orientation can strengthen the strategic management of organisations.

Richardson (1995) examines the nature of crisis-prone organisational beliefs and behaviours and focuses mainly on disaster - proneness. Richardson shows that narrow views of reality and the organisational systems and

behaviours promoted by such views lead to crisis events. He concludes that many of us work in organisations which are "crises waiting to happen". Such observations lead to a generalisation that the management and employees of the organisation catalyse crises with their inertia.

The practical conclusion that comes from these studies, although not presented by Richardson, is that mechanisms should be developed for warning against the limited perception of the environment and threats by members of the organisation. It leads to the generalisation that crisis management based on risk analysis may be useless in the context of organisational unpredictability.

The importance of risk assessment presents many researchers (Simunic & Stein, 1990; Friedlob & Schleifer, 1999; Reamer, 2000; Chang et al., 2008; Phillips, 2011; Wang & Li, 2011; Christensen, Glover, & Wood, 2013; Amir, Kallunki & Nilsson, 2014; Gramling & Schneider, 2018). Uncertainty differs from risk (Dobrowolski, 2020). One may measure and quantify the risk, and the potential outcomes are known—uncertainty links with unpredictable future events. One may mitigate the risk. Uncertainty is beyond the control of the individual, group or organisation (Cook, 1988; Alaszewski & Coxon, 2008; Samson, Reneke & Wiecek, 2009; Renn, Klinke & van Asselt, 2011; Dobrowolski, 2020).

The most crucial challenge for organisations operating in conditions of uncertainty is the ability to respond to unpredictable situations actively (Dobrowolski, 2020). Organisations which want to exist in an unpredictable environment need solid roots based on social capital, where trust plays a key role (c.f. Coleman, 1990; Prusak & Cohen, 2001; Adler & Seok-Woo, 2002; Hansen, 2002; Dobrowolski, 2020). Such organisations have to use foresight, which may help tame many unknowns of uncertainty through the selection of one of the different future options and creation conclusion for the present, and decision for one of the options (c.f., Ansoff, 1980; Martin, 1995; Barker & Smith, 1995; Miles, 2008; Cuhls, 2008; Liebl & Schwarz, 2010; Cuhls, 2003; Georghiou et al., 2008; Greenblott, O'Farrell, & Olson, 2018; Cuhls, 2019; Dobrowolski, 2020; Gordon & Helmer, 1964; Bright & Schoeman,1973; Martino, 1983; Andriopoulos & Gotsi, 2006; Popper, 2008, 2008a).

Foresight includes identification of weak signals and wild cards. Weak signals are early, often inaccurate, signs of impending events. These events, after the occurrence, affect individuals, groups and organisations and their environment in the very indefinite future (Botterhuis et al., 2010; Dobrowolski, 2020). Weak signals are precursor events, or they are early warnings, namely slight changes in the current state of affairs or existing trends that−if observed and correctly interpreted−may hint at a growing likelihood of occurrence of a specific Wild Card. These signals may be unclear at the beginning, but they may become more precise in time (if monitored) or more reliable, perhaps in combination with other signals (Botterhuis et al., 2010; Brynielsson, 2013; Dobrowolski, 2020). Wild Cards are potential future events with a low likelihood of occurrence but with high impact in the future, if they occur (Mendonca et al., 2004; Smith & Dubois, 2010; Hauptman, Hoppe & Raban, 2015; Qi & Tapio, 2018; Dobrowolski, 2020). Researchers (c.f., Mendonca et al., 2004) advocate the implementation of a weak signal methodology and identification of wild cards by scanning the decision environment. They suggest the nurture of improvisation capabilities, which help exist in an unpredictable environment. This approach may lead to organisational agility (Ilmola & Kuusi, 2006; Dobrowolski, 2020).

The appearance of past cases of transmission of animal diseases to humans and the fact of functioning in the conditions of globalisation should be a sufficient signal to take remedial actions to prepare for a new pandemic properly. It was, therefore, necessary to introduce mechanisms for the selection of potentially sick patients at all border crossing points, in particular airports. It was necessary to determine the capacity of hospitals and their equipment with life-saving measures. There is a need to redefine economic policy. Current policy is flawed due to based on greed manifested in need to achieve ever-higher profits and satisfaction of shareholders and leading to the relocation of production to countries with lower production costs. This short-sighted policy led to the emergence of monopolistic practices and total dependence on supplies in one or two countries. The effects of

breaking the supply chain were noticeable. It was a crucial weak signal of upcoming economic disaster, and it is unbelievable that such visible signals have been ignored. It is, therefore, necessary to end this policy and rebuild "strategic" production in individual countries. One must move away from the naive assumption that business is transnational. Business is and will be national because it is too dependent on politicians.

2. Methodology

The observation of the scale of COVID-19 problems in the following countries: the USA, Spain, Italy, the United Kingdom and France leads to the following generalisation. Crisis management in those countries is in crisis. Next, I started to literature review to establish whether crisis management relational approach based on risk management is appropriate in conditions of unpredictability? I aware that literature study as the primary research method can be perceived as the limitations of this research. However, I argue that literature research is valuable, though secondary, source of evidence. In management sciences, theories are build based on practice. The lack of any reference in the literature about foresight in crisis management may confirm that such a solution was not taken into account. Consistent with an abductive approach (Lukka, 2014; Lukka & Modell, 2010), the insights in this paper have emerged iteratively through consideration of both theory and the empirical cases.

3. Results
3.1. Approach of crisis management

Jaques (2007) showed that linear life-cycle models of crisis management are flawed and did not fail to capture the full dynamics of changes. Therefore, there is a need to use a non-linear, relational construct which considers issue and crisis management in the context of interdependent activities, which must be managed at different stages. He aptly notes that such an approach includes the role of issue-solving management in both the pre-crisis and post-crisis phases.

The traditional approach, called "event approach" regards a crisis as an adverse event. It focuses on incident response – what an organisation has to do when a crisis occurs and how to prepare for it in case it happens (Jaques, 2010). However, this concept is based on the assumption that "a crisis is a sudden and unexpected event that threatens to disrupt an organisation's operations and poses both a financial and reputations threat" (Coombs, 2007, p. 164) or "a crisis is an unplanned (but not necessarily unexpected) event that calls for real-time high-level strategic decisions in circumstances where making the wrong decisions, or not responding quickly or proactively enough, could seriously harm the organisation" (Davies, 2005, p. 69). Meanwhile, the crisis occurs because the organisation is flawed, which means that there were no preventive measures to predict crisis occurrence.

Recently a distinct tendency for crisis management evolves beyond the operationalised response. It flows from the argument of a growing awareness that organisations should focus on identifying any signs of crisis to avoid it. It has led to increasing acceptance of crisis management as part of a process continuum. What does it mean? It means that organisations need to take into account that: a) most crises are not sudden events; b) that leaders and managers have to be familiar with red flags of crisis and ensure that such red flags are consistently developed. Familiarity with red flags may prevent potential crises, or to mitigate those which do occur. Pauchant and Mitroff aptly note that "Crisis management is not the same as crash management – what to do when everything falls apart" (Pauchant & Mitroff, 1992, p. 11). It means that they pointed out the proactive approach to the crisis. Shrivastava (1995) noticed that crises are not events but processes (Jaques, 2010).

Crises are not discrete events, but mostly high-intensity nodes in ongoing streams of social interaction ('t Hart, Heyse & Boin, 2000, p. 185). It means that crisis is an ongoing process, which after disclosure and application of remedies mutates and occurs in a different form. It, therefore, requires constant tracking of early signals, named weak signals, or symptoms or "red flags" of crises. Such approach is complementarity between the event approach

and the process approach to crisis management, and I do not compare these the approaches in detail knowing that it was analysed in the past (c.f., Forgues & Roux-Dufort, 1998; Jaques 2009; Roux-Dufort, 2007, Jaques, 2010). Following Jaques study I also identify the challenge in the present study is how to represent the new crisis process approach in a way which translates into structural design, utilising the continuum of established management terminology and activity. I also agree with Roux-Dufort (2007) and Jaques (2010) that in the situation of different organisational needs, there is no best practice model for how to resolve the crisis. Many organisations may reflect a combination of both the event and the process approach to crisis management.

Jaques proposes to take into account the process continuum approach instead of the event approach, which means the implementation of more fully integrated, a non-linear model which establishes crisis management as a cyclical construct (Jaques, 2007). In his model one may recognise four cores: crisis preparedness; crisis prevention; crisis even management and post-crisis management, which includes the last and simultaneously first stage: evaluation and modification of activities.

Crisis preparedness includes planning processes, systems manuals, training and simulations. Crisis prevention includes early warning scanning, issue and risk management and emergency response. Crisis event management includes crisis recognition, system activation/response and crisis management. Post-crisis management includes recovery, business resumption, post-crisis issue impact, evaluation and modification (Jaques, 2007, 2010).

Analysis of this model leads to the identification of some organisational problems. There is unclear why Jaques distinguishes crisis preparedness as a separate core and does not link this core with crisis prevention. According to (the very well-recognised in management sciences) Adamiecki and Chatelier the cycle of organised activity, the analysis should precede planning. It means that planning processes should be effects of weak signals, but simultaneously weak signals scanning should proceed as planned. There is, therefore, a need for link early weak signals with planning instead of distinguishing between two cores, including separately planning and scanning signals.

Jaques (2010) aptly notes that non-linear construct includes related and integrated activities which may overlap or coincide. Nevertheless, the proposed model can lead to misunderstanding and different perceptions of the model's assumption. Even if the cyclical model is not linear assumes a particular sequence of events, because of consists of cycles of the circle. Based on Jaques model, I propose modified (figure 1) new crisis management relational model named three-dimensional crisis management model.
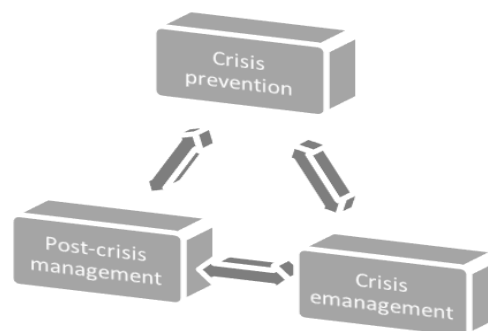
Figure 1. Three-dimension crisis management model
Source: Own elaboration based on Jaques 2007, 2010.

Jaques (2010) correctly postulates the organisational need to crisis preparedness includes many of the primary activities, such as planning processes, including traditional exercises and simulations. However, it may be

unnecessary to plan simulation based on experience from the past. It has to be supplemented by weak signals scanning. It seems that proposed orderly and logical nonlinear construct, which is, however, a phased structure, should be replaced by a three-dimensional structure, named "glue structure", where preventive activities, including among others, early warning systems and risk/issue management, are realised simultaneously with post-crisis management. Such an approach will enable limitation of adverse organisational, managerial, social, economical and political effects of crises. The cited author noticed it is a very natural human tendency to focus on moving on from the crisis as quickly as possible and returning to former conditions. There is an extensive literature on change management, where authors pointed out the organisational desire to back to the old track (Wilson, 1992; Kotter, 1996; Senior, 2002; Todnem, 2005). The barriers to management learning and organisational improvement in the aftermath of a crisis are also recognised (c.f. Elliott, Smith & McGuinness, 2000; Jaques, 2008). Jaques (2010) correctly notes that resistance by any organisation to a frank assessment of its shortcomings is understandable, but the post-crisis phase is necessary to improve the organisational activities.

Again, I conclude correctness of Jaques (2010) arguments that the effective way of counteracting crises is to institutionalise a crisis prevention mindset instead of just focusing on crisis response. This multifaceted approach includes but is not limited to a deep understanding of systemic causes of previous crises. Systemic failures are a known cause of significant crises. There is a lot of evidence from the past that limitations of faults were deliberately suppressed (Esser & Lindoerfer, 1989; Starbuck & Milliken, 2007, Jaques, 2010). Such a situation is usually fuelled by ethical gaps in organisations and a lack of trust in organisations. Therefore, the effective preparedness to the crisis requires a change of thinking and behaviour.

Believing that crisis is inevitable and upcoming should replace naive believe that organisation may omit crisis. In the situation of the organisation's functioning in the conditions of globalisation, the crisis will occur. Creating a culture of trust and openness is necessary to eliminate examples of hiding problems. I agree with Jaques (2010) and Brown (2002) that crisis is catalysed by lack of imagination and inadequate analysis; rather than due to lack of information. Therefore, I suggest the need to build "weak signals" thinking and change approach from forecasting to foresight.

3.2. Core values of Crisis Management

Review of literature showed that successful crisis management needs a culture based on openness to experience and change, creativeness, ethical behaviour. Taking into account these requirements, I modify the Norton and Kaplan balanced scorecard, and I formulate four core values of crisis management (Figure 2 and 3). I assume that a mechanism for building relationships and other intangibles between individuals and organisations are just as important as the ability to financing crisis management.
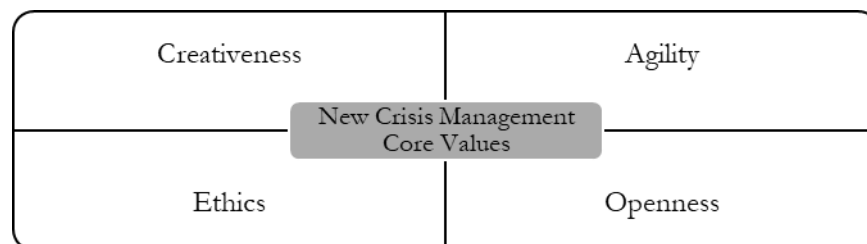
Figure 2. Balanced Core Values of New Crisis Management
Source: Own elaboration based on Kaplan Norton Balanced Scorecard.

To succeed in unpredictable environment, how will we sustain and develop our ability to change and make improvements?	Creativeness			
	Objectives	Measures	Targets	Initiatives
To achieve our goals, how will we sustain and develop our ability to act agility to effectively exist in unpredictable environment?	Agility			
	Objectives	Measures	Targets	Initiatives
To satisfy our clients which business processes must we excel at?	Ethics			
	Objectives	Measures	Targets	Initiatives
To achieve our vision how should we communicate to our clients?	Openness			
	Objectives	Measures	Targets	Initiatives

Figure 3. Elements of Balanced Scorecard of Crisis Management
Source: Own elaboration based on Kaplan Norton Balanced Scorecard

Effective crisis management requires the appropriate formulation of objectives, design and management of each of the three levels: organisation, process and workplace. I specify nine variables that create crisis management matrix (figure 4). Three variables affect the organisation's performance in each of its areas. They show ways in which the organisation's goals are achieved, the way of designing the activities and the way of managing the organisation may influence three levels of effectiveness: the level of organisation, the level of the process and the level of the workplace. This approach is similar to the one proposed by Rummler and Brache in achieving organisational effectiveness (Dobrowolski & Szejner, 2019; Rummler & Brache, 1995). I modify this approach adding the need to identify weak signals in nine variables of organisations.

Figure 4. Nine Variables of Crisis Management
Source: Own elaboration based on (Dobrowolski & Szejner, 2019; Rummler & Brache, 1995).

Conclusions

The aim of this research was achieved. The public organisations, entrepreneurs and consumers live in more uncertainly environment caused by the pandemic. In such circumstances, the risk-based approach is not sufficient. This research confirmed arguments of Jaques (2010) the need to establishing effective mechanisms to recognise and respond to weak signals. However, the non-linear model based on circle crisis management model needs to be

replaced by the three-dimensional model, where the flexibility of crisis management exists. I also confirm Jaques' (2010) postulate the organisational need to crisis preparedness includes many of the primary activities, such as planning processes, including traditional exercises and simulations. However, I argue that it may be useless to plan and carry out simulation-based on experience from the past. It hasto be supplemented by weak signals scanning. Concluding correctness of Jaques (2010) arguments that the effective way of counteracting crises is to institutionalise a crisis prevention mindset instead of just focusing on crisis response I argue that naive believing that organisation may omit crisis should be replaced by an approach that crisis is inevitable and upcoming. I agree with Brown (2002) that crisis is catalysed by lack of imagination and inadequate analysis. Therefore, I suggest the need to build "weak signals thinking" and change the approach from forecasting to foresight.

There were a lot of weak signals of the imminent crisis in the past, and it is unbelievable that no one identified the immediate threat. Further research and practice should enable determining why weak signals are ignored. Regardless of the future scope of research, based on literature study where the importance of social capital for the organisation functioning in an unstable environment is underlined, I propose to use the modified the Norton and Kaplan balanced scorecard, and I formulate four core values of crisis management. Besides, I noticed that effective crisis management requires the appropriate formulation of objectives, design and management of each of the three levels: organisation, process and workplace. I specify nine variables that create crisis management matrix, and I argue the need to identify weak signals related to each of this variable.

This article can be useful for practitioners. The important lesson here is not just identifying to a wide range of weak signals but also their analysis. Crisis costs too much because someone is to turn a blind eye to improper management practices.

References

Alaszewski, A. & Coxon, K. (2008). The everyday experience of living with risk and uncertainty, *Journal Health, Risk & Society*, 10(5): 413-420. https://doi.org/10.1080/13698570802383952

Adler, P.S., & Seok-Woo, K. (2002). Social capital: prospects for a new concept, *Academy of Management Review,* 27(1): 17-40. https://doi.org/10.5465/AMR.2002.5922314

't Hart, P., Heyse, L., & Boin, A. (2001). New trends in crisis management and crisis management research: Setting the agenda, *Journal of Contingencies and Crisis Management*, 9(4): 181-188. https://doi.org/10.1111/1468-5973.00168

Amir, E., Kallunki, J. & Nilsson, H. (2014). The association between individual audit partners' risk preferences and the composition of their client portfolios, *Review of Accounting Studies*, 19: 103–133. https://doi.org/10.1007/s11142-013-9245-8

Andriopoulos, C. & Gotsi, M. (2006). Probing the future: Mobilising foresight in multiple-product innovation firms, *Futures*, 38(1): 50-66. https://doi.org/10.1016/j.futures.2005.04.003

Ansoff, H.I. (1980). Strategic Issue Management, *Strategic Management Journal*, 1(2): 131-148. https://www.jstor.org/stable/2486096

Barker, D. & Smith, D.J.H. (1995). Technology foresight using roadmaps, *Long Range Planning*, 28(2): 21-28. https://doi.org/10.1016/0024-6301(95)98586-H

Besenyő, J., & Kármán, M. (2020). Effects of COVID-19 pandemy on African health, poltical and economic strategy. *Insights into Regional Development*, 2(3): 630-644. https://doi.org/10.9770/IRD.2020.2.3(2)

Boling, T.E. (1978). The Management Ethics "Crisis": An Organizational Perspective, *Academy of Management Review*, 3(2): 360-365. https://doi.org/10.5465/amr.1978.4295577

Botterhuis, L., van der Duin, P., de Ruijter, P. & van Wijck, P. (2010). Monitoring the future. Building an early warning system for the Dutch Ministry of Justice, *Futures*, 42(5): 454-465. https://doi.org/10.1016/j.futures.2009.11.030

Bright, J.R. & Schoeman, M.E.F. (1973). *A Guide to Practical Technological Forecasting*. Englewood Cliffs, NJ: Prentice Hall

Brown, A. (2002). Avoiding unwelcome surprises. *The Futurist*, 36(5): 21-23.
Retrieved from https://search.proquest.com/openview/15987d5d1a870a0c1bd96c85375e8ee3/1?pq-origsite=gscholar&cbl=47758

Brynielsson, J., Horndahl, A., Johansson, J., Kaati, L., Mårtenson, Ch. & Svenson, P. (2013). Harvesting and analysis of weak signals for detecting lone wolf terrorists, *Security Informatics*, 2(11): 1-15. https://doi.org/10.1186/2190-8532-2-11

Chang, S.I, Tsai, Ch. F., Shih, D.H. & Hwang, Ch. L. (2008). The development of audit detection risk assessment system: Using the fuzzy theory and audit risk model, *Expert Systems with Applications*, 35(3): 1053-1067. https://doi.org/10.1016/j.eswa.2007.08.057

Christensen, B. E., Glover, S. M., & Wood, D. A. (2012). Extreme estimation uncertainty in fair value estimates: Implications for audit assurance, *Auditing. A Journal of Practice & Theory*, 31(1): 127– 46. https://doi.org/10.2308/ajpt-10191

Coleman, J.S. (1990). *Foundation of Social Theory*. Cambridge, Ma: Harvard University Press.

Cook, R. M. (1988). Uncertainty in risk assessment: A probabilist's manifesto, *Reliability Engineering & System Safety*, 23(4): 277-283. https://doi.org/10.1016/0951-8320(88)90039-7

Coombs, W. T. (2007). Protecting organization reputations during a crisis: The development and application of situational crisis communication theory, *Corporate Reputation Review*, 10(3): 163-176. https://doi.org/10.1057/palgrave.crr.1550049

Cuhls, K.E. (2003). From forecasting to foresight processes—new participative foresight activities in Germany, *Journal of Forecasting*, 22(2-3): 93-111. https://doi.org/10.1002/for.848

Cuhls, K.E. (2008). Methoden der Technikvorausschau – eine internationale Übersicht (Methods of Technology Foresight – an international overview). Stuttgart, Germany: IRB Verlag. Retrieved from http://www.isi.fraunhofer.de/isimedia/docs/v/de/Methodenvorausschau.pdf

Cuhls, K.E. (2019). Horizon Scanning in Foresight – Why Horizon Scanning is only a part of the game, *Futures & Foresight Science*, 2(1): 1-21. https://doi.org/10.1002/ffo2.23

Davies, D. (2005). Crisis management: Combating the denial syndrome, *Computer Law and Security Report*, 21(1): 68-73. https://doi.org/10.1016/j.clsr.2005.01.016

Dobrowolski, Z. & Szejner, T. (2019). Public Ethnocentrism. An Obstacle of Worldwide Economic Development: Concept and a Preliminary Research, *Journal of Intercultural Management*, 11(1): 125-147. https://doi.org/10.2478/joim-2019-0006

Dobrowolski, Z. (2017). *Combating Corruption and Other Organisational Pathologies*. Frankfurt Am Main: Peter Lang GmbH, Internationaler Verlag der Wissenschaften.

Dobrowolski, Z. (2020). The supreme audit institutions readiness to uncertainty. *Entrepreunership and Sustainability Issues*, 8(1): 513-525. http://doi.org/10.9770/jesi.2020.8.1(36)

Elliott, D., Smith, D., & McGuinness, M. (2000). Exploring the failure to learn: Crises and barriers to learning, *Review of Business*, 21(3): 17-24. https://doi.org/10.1177/1350507607083205

Esser, J. K., & Lindoerfer, J. S. (1989). Groupthink and the space shuttle Challenger accident: Toward a quantitative case analysis, *Journal of Behavioral Decision Making*, 2(3): 167-177. https://doi.org/10.1002/bdm.3960020304

Forgues, B., & Roux-Dufort, C. (1998). Crises: Events or Processes? Paper presented at Hazards and Sustainability: Contemporary Issues in Risk Management, Durham, UK, 26-27 May. Retrieved from https://scholar.google.pl/scholar?hl=pl&as_sdt=0%2C5&q=Crises%3A+Events+or+Processes%3F+Paper+presented+at+Hazards+and+Sustainability&btnG=

Friedlob, G. & Schleifer, L. (1999). Fuzzy logic: application for audit risk and uncertainty, *Managerial Auditing Journal*, 14(3): 127-137. https://doi.org/10.1108/02686909910259103

Georghiou, L., Harper, J. C., Miles, I., Keenan, M., & Popper, R. (2008). *The handbook of technology foresight, concepts and practice, PRIME series on research and innovation policy*. Cheltenham, UK & Northampton, MA: Edward Elgar.

Ghosh, A., Ostry, J. & Qureshi, M. (2015). Exchange Rate Management and Crisis Susceptibility: A Reassessment, *IMF Economic Review*, 63: 238–276. https://doi.org/10.1057/imfer.2014.29

Gordon, T.J. & Helmer, O. (1964). *Report on a Long-Range Forecasting Study*. Santa Monica, California: Rand Corporation.

Gramling, A. & Schneider, A. (2018), Effects of reporting relationship and type of internal control deficiency on internal auditors' internal control evaluations, *Managerial Auditing Journal*, 33(3): 318-335. https://doi.org/10.1108/MAJ-07-2017-1606

Greenblott, J.M., O'Farrell, T. & Olson, R. (2018). Strategic Foresight in the Federal Government: A Survey of Methods, Resources, and Institutional Arrangements, *World Futures Review*, 11(3): 245-266. https://doi.org/10.1177/1946756718814908

Hansen, M.T. (2002), Knowledge Networks: Explaining Effective Knowledge Sharing in Multiunit Companies, *Organization Science*, 13(3): 223-353. https://doi.org/10.1287/orsc.13.3.232.2771

Hauptman, A., Hoppe, M. & Raban, Y. (2015). Wild cards in transport, *European Journal of Futures Research*, 3(1): 1-24. https://doi.org/10.1007/s40309-015-0066-9

Ilmola, L. & Kuusi, O. (2006). Filters of weak signals hinder foresight: Monitoring weak signals efficiently in corporate decision-making, *Futures*, 38(8): 908-924. https://doi.org/10.1016/j.futures.2005.12.019

Jaques, T. (2007). Issue management and crisis management: An integrated, non-linear, relational construct, *Public Relations Review*, 33(2): 147-157. https://doi.org/10.1016/j.pubrev.2007.02.001

Jaques, T. (2008). A case study approach to issue and crisis management: Schadenfreude or an opportunity to improve? *Journal of Communication Management*, 12(3): 192-203. https://doi.org/10.1108/13632540810899399

Jaques, T. (2009). Issue and crisis management: Quicksand in the definitional landscape, *Public Relations Review*, 35(3): 280-286. https://doi.org/10.1016/j.pubrev.2009.03.003

Jaques, T. (2010). Reshaping crisis management: the challenge for organizational design, *Organizational Development Journal*, 28(1): 9-17.Retrieved from http://www.issueoutcomes.com.au/Websites/issueoutcomes/Images/Reshaping%20crisis%20management%20ODJ.pdf

Johansen, W., Aggerholm, H. K. & Frandsen, F. (2012). Entering new territory: A study of internal crisis management and crisis communication in organizations, *Public Relations Review*, 38(2): 270-279. https://doi.org/10.1016/j.pubrev.2011.11.008

Kaplan, R.S. (2010). Conceptual Foundations of the Balanced Scorecard. Working Paper 10-074. Harvard Business School. Retrieved from https://www.hbs.edu/faculty/publication%20files/10-074_0bf3c151-f82b-4592-b885-cdde7f5d97a6.pdf

Kotter, J. P. (1996). *Leading Change*, Boston, MA: Harvard Business School Press.

Kouzmin, A. (2008). Crisis Management in Crisis? *Journal of Administrative Theory & Praxis*, 30(2): 155-183. https://doi.org/10.1080/10841806.2008.11029631

Liebl, F. & Schwarz. J. O. (2010). Normality of the future: Trend diagnosis for strategic foresight, *Futures*, 42(4): 313-327. https://doi.org/10.1016/j.futures.2009.11.017

Lukka, K. (2014). Exploring the possibilities for causal explanation in interpretive research, *Accounting, Organizations and Society*, 39(7): 559– 566. https://doi.org/10.1016/j.aos.2014.06.002

Lukka, K., & Modell, S. (2010). Validation in interpretive management accounting research, *Accounting, Organizations and Society*, 35(4): 462– 477. https://doi.org/10.1016/j.aos.2009.10.004

Mansfeld, Y. (1999). Cycles of War, Terror, and Peace: Determinants and Management of Crisis and Recovery of the Israeli Tourism Industry, *Journal of Travel Research*, 38(1): 30-36. https://doi.org/10.1177/004728759903800107

Martin, B.R. (1995), Foresight in science and technology, *Technology Analysis & Strategic Management*, 7(2): 139-168. https://doi.org/10.1080/09537329508524202

Martino, J.P. (1983). *Technological Forecasting for Decision Making, 2nd edition*. New York, Amsterdam, Oxford: North-Holland.

Mendonca, S., Pina e Cunha, M., Kaivo-oja J. & Ruff F. (2004). Wild cards, weak signals and organizational improvisation, *Futures*, 36(2): 201-218. https://doi.org/10.1016/S0016-3287(03)00148-4

Miles, I. (2008). From futures to foresight. In L. Georghiou (Ed.) The handbook of technology foresight, concepts and practice, PRIME series on research and innovation policy (pp. 24–43). Cheltenham, UK and Northampton, MA: Edward Elgar.

Müller, R. (1985). Corporate crisis management, *Long Range Planning*, 18(5): 38-48. https://doi.org/10.1016/0024-6301(85)90199-2

Okike, E. (2004). Management of crisis: The response of the auditing profession in Nigeria to the challenge to its legitimacy, *Accounting, Auditing & Accountability Journal*, 17(5): 705-730. https://doi.org/10.1108/09513570410567782

Paraskevas, A. (2006), Crisis management or crisis response system? A complexity science approach to organizational crises, *Management Decision*, 44(7): 892-907. https://doi.org/10.1108/00251740610680587

Pauchant, T. C., & Mitroff, I. I. (1992). *Transforming the crisis prone organization*. San Francisco, CA: Jossey-Bass.

Pearson, C. M., & Clair, J. A. (1998). Reframing crisis management, *The Academy of Management Review*, 23(1): 59-76. https://doi.org/10.5465/amr.1998.192960

Phillips, J. (2011). Target, Audit and Risk Assessment Cultures in the Probation Service, *European Journal of Probation*, 3(3): 108-122. https://doi.org/10.1177/206622031100300308

Popper, R. (2008). Foresight methodology. In L. Georghiou, J. Cassingena, M., Keenan, I. Miles, & R. Popper (Eds.), The Handbook of Technology Foresight (pp. 44–88). Cheltenham: Edward Elgar.

Popper, R. (2008a). How are foresight methods selected? *Foresight - The journal of future studies, strategic thinking and policy*, 10(6): 62-89. doi: https://doi.org/10.1108/14636680810918586

Preble, J.F. (1997). Integrating the Crisis Management Perspective into the Strategic Management Process, *Journal of Management Studies*, 34(5): 769-791. https://doi.org/10.1111/1467-6486.00071

Prusak, L. & Cohen, D. (2001). How to invest in social capital, *Harvard Business Review*, 79(6): 86-93. https://doi.org/10.1093/0195165128.003.0001

Qi, J. & Tapio, P. (2018). Weak Signals and Wild Cards Leading to Transformative Disruption: A Consumer Delphi Study on the Future of e-Commerce in China, *World Futures Review*, 10(1): 44-82. https://doi.org/10.1177/1946756717752921

Reamer, F. G. (2000). The Social Work Ethics Audit: A Risk-Management Strategy, *Social Work*, 45(4): 355–366. https://doi.org/10.1093/sw/45.4.355

Renn, O., Klinke, A. & van Asselt, M. (2011). Coping with Complexity, Uncertainty and Ambiguity in Risk Governance: A Synthesis, *AMBIO*, 40: 231–246. https://doi.org/10.1007/s13280-010-0134-0

Richardson, B. (1995). Paradox management for crisis avoidance, *Management Decision*, 33(1): 5-18. https://doi.org/10.1108/EUM0000000003896

Roux-Dufort, C. (2007). A Passion for imperfections: Revisiting crisis management. In C. M. Pearson, C. Roux-Dufort & J. A. Claire (Eds.), International Handbook of Organizational Crisis Management, (pp. 221-252). Thousand Oaks, CA: Sage.

Rummler, G.A.& Brache, A.P. (1995). *Improving Performance: How to Manage the White Space in the Organization Chart*. San Francisco: Jossey-Bass Inc.

Samson, S., Reneke, J.A., Wiecek, M.M. (2009). A review of different perspectives on uncertainty and risk and an alternative modeling paradigm, *Reliability Engineering & System Safety*, 94(2): 558-567. https://doi.org/10.1016/j.ress.2008.06.004

Senior, B. (2002). *Organisational Change, 2nd edition*. London: Prentice Hall.

Shrivastava, P. (1995). Ecocentric management for a globally changing crisis society. Paper presented at National Conference, Academy of Management, Vancouver, BC, Canada

Simunic, D.A. & Stein, M. T. (1990). Audit risk in a client portfolio context, *Contemporary Accounting Research*, 6(2): 329-343. https://doi.org/10.1111/j.1911-3846.1990.tb00762.x

Smith, Ch. J. & Dubois, A. (2010). The 'Wild Cards' of European futures: Planning for discontinuities? *Futures*, 42(8): 846-855. https://doi.org/10.1016/j.futures.2010.04.016

Smith, D. (2005). Business (not) as usual: Crisis management, service recovery and the vulnerability of organizations, *Journal of Services Marketing*, 19(5): 309-320. https://doi.org/10.1108/08876040510609925

Starbuck, W. H., & Milliken, F. J. (2007). Challenger: Fine-tuning the odds until something breaks, *Journal of Management Studies*, 25(4): 319-340. https://doi.org/10.1111/j.1467-6486.1988.tb00040.x

Todnem, R. (2005). Organisational change management: A critical review, *Journal of Change Management*, 5(4): 369-380. https://doi.org/10.1080/14697010500359250

Wang, Y. & Li, M. (2011). The Role of Internal Audit in Engineering Project Risk Management, *Procedia Engineering*, 24: 689-694. https://doi.org/10.1016/j.proeng.2011.11.2719

Wilson, D. C. (1992). *A Strategy of Change*, London: Routledge.

Acknowledgements

Zbyslaw DOBROWOLSKI is the Professor of Jagiellonian University, Poland and member of the Scientific Council at the Financial Ombudsman, Minister of Finance. He was the editor of the International Journal on Governmental Financial Management, USA. He is co-author of worldwide INTOSAI auditing standards and guidelines. INTOSAI expert involved in numerous international programs of public business excellence. Author of numerous scientific papers, including twenty monographs. Research interests: business excellence, risk management, sustainability, public management.
ORCID ID: orcid.org/0000-0003-1438-3324

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

KANO MODEL AS A TOOL OF EFFECTIVE CUSTOMER SATISFACTION DIAGNOSTICS OF POSTAL SERVICES

Maria Rostasova [1], Anna Padourova [2], Tatiana Corejova [3]

[1,2,3] *University of Zilina, Univerzitna 8215/1, 01026 Zilina, Slovakia*

E-mails: [1]maria.rostasova@fpedas.uniza.sk; [2]anna.padourova@fpedas.uniza.sk; [3]tatiana.corejova@fpedas.uniza.sk

Abstract. The paper deals with the solution of the issue of achieving customer satisfaction of the postal company. Through the diagnostic procedures used in quality management in services, the focus is on the application of KANO model as one of the customer satisfaction measurement models. The primary research carried out in four different districts of Slovakia identified the relationship between customer satisfaction level and quality attributes through 5 categories of perceived quality by customers. The categories were identified as attractive, one-dimensional, mandatory, insignificant and contradictory attributes of postal products that create their quality parameters and reflect the requirements of customers. Significant findings concern mainly the identified differences in survey results in individual selected districts of Slovakia. There were also differences in the categories of postal quality requirements in respondent segments that differed in gender, residence, or age of respondents. One of the conclusions of the solved issue is to propose framework therapeutic procedures in response to individual diagnostic statements that resulted from the performed research activities.

1. Introduction

Every company needs to know their customers to identify what are their requirements for the offered services. It is therefore clear that the importance of measuring customer satisfaction has been growing for a long time. Examining customer satisfaction has an irreplaceable place in the algorithms of marketing activities, whether it is the identification and measurement of customer satisfaction or customer dissatisfaction. Proof of this statement is that most research activities aimed at satisfaction research focus on the opposite view, customer dissatisfaction. This view is still currently part of contributions in major professional publications around the world e.g. Juznik Rotar, L. and Kozar, M. (2017) discusses this issue in the environment of modern online shopping. Other authors

(Mateides and Dado, 2002, Bostanci and Erdem, 2020, Alam et al. 2020) use modern and effective analytical procedures to investigate such a "simple" issues at first glance that include fuzzy multicriteria decision-making techniques and geostatic modules. Some authors, such as Jankalova and Jankal (2020), also link customer satisfaction research with the process of globalization and with the pressure to achieve and maintain the competitiveness of the enterprise on domestic and international market.

A customer is a person or institution that creates a demand for products or services. Customer satisfaction is achieved through the strict orientation of companies to meet customer requirements and expectations (Kmet, 2001). Customer orientation means an individual approach to the customer and learning from experience in order to maintain his/her satisfaction, among other things (Mateides and Dado, 2002).

In the literature, we encounter several definitions clarifying the concept of customer satisfaction. Standard STN 9000: 2015 Quality Management Systems – Basic Vocabulary (2015) defines this term as: "Customer satisfaction expresses the level perceived by customers to the extent to which their requirements have been met." Jones (1995) says that "needs and expectations are satisfied at all times, throughout the life of the product or service. Without it, we would not gain the trust of the customer." „Overall, customer satisfaction can be understood as the result of a complex psychological comparison process" (Hund 1997, Oliver 1980 according to Mateides, 1999, p. 10). Mateides (1999) states that satisfaction is "the result of a complex psychological comparison process, where the customer compares his/her own experience after using a product or service with expectations, desires, individual norms or other benchmarks". Rostasova et al. (2008) talks about "comparing customer expectations with reality. Of course, the expectations of each customer are different and influenced by the customer himself/herself. Their individual demands have a significant impact on customers' expectations." Kotler, Amstrong (2004) states that: "Customer satisfaction depends primarily on how far it is perceived or fulfilled customer expectations in relation to the acquired product or the value it brings to the customer. Successful companies strive to make their customers happy because then they buy the product repetitively and share their good experience, too" Kita et al. (2010) defines customer satisfaction as a „condition that the customer feels from the use of the purchased product or services, and which expresses the degree of compliance of the offer with the customer's expectations evoking his/her behaviour. Customer satisfaction is reflected in his/her repeated purchases."

The situation where customers are satisfied and they also show it through their purchasing decisions, we cannot yet call their loyalty. Satisfaction is a condition that can flip to one side or the other. One mistake is enough, and the customer can "replace" the company. If satisfaction is an expression of state, loyalty is the action that results from that state. To have loyal customers means, firstly to be sure that they do not buy from the competition, and that even in the case of a negative experience with the conduct of the company, they will not immediately go to the competitive company (Ligasova, 2013).

The term satisfaction of customer requirements means the perception and understanding of customer expectations that the company has fulfilled or exceeded through its activities.

Evaluating customer satisfaction identifies how customers understand the business. The evaluation of the satisfaction of the customer's requirements takes place only in his/her head and may or may not suit the actual situation. People form their attitudes quickly, but they change them very slowly (Mateides and Dado, 2002).

There are several theoretical approaches to measuring customer satisfaction, including for example: differential model of customer satisfaction, model of possible reactions, Kano model, model GAP 5 and others. New and new recommendations and procedures are constantly being created in the works of experts around the world and goes into absolute detail in the issue of achieving customer satisfaction. For example, Suarez (2015) presented how written communication with the customer should take place in order to achieve a higher degree of satisfaction in handling complaints and grievances. He pointed out the importance of the correct structure/content of written communication, punctuation, grammar, decency, etc.

We attribute customer dissatisfaction to negative feelings, such as disappointment that can arise from a comparison of an expected and perceived product or service. We can say that if the actual performance of the product or service is lower than the customer expects, the customer will be dissatisfied. The direct ratio applies here, the more the gap between the expectation and the actual performance/value of the product or service deepens, the more dissatisfied the customer will be. We understand dissatisfaction as the opposite of satisfaction. The following factors influence the increase in customer dissatisfaction (Salgovicova, 2005):

- ➢ Objective factors:
  - Variant selection - more equivalent alternatives - the customer decides more easily when choosing a product, if the selected variant significantly exceeds other possibilities of solving the problem. When the customer is deciding between several similar variants, his/her decision-making can also be influenced by rational stimuli;
  - Limited possibility of testing - in some areas of business, such as delivery services, the customer does not have the opportunity to get acquainted with the real properties of the product, which can cause him/her a feeling of post-purchase dissatisfaction. In such situations, it can use reference recommendations to "materialize" the offer;
  - Voluntary purchase - it seems paradoxical, but it often happens that when the customer does not have much choice when buying, he/she will accept it rather than with a larger selection, because he/she has no other choice;
  - The possibility of product return - we know from practice that in the phase of deciding between alternatives to the product, the customer behaves more tolerant. It is easier to decide if he/she knows about the possibility of returning the product. It is not pleasant for a company when a dissatisfied customer returns a product, but it helps to reduce the impact of various misunderstandings on the customer's further purchasing behaviour.
- ➢ Subjective factors:
  - Poor information - when the customer has little information about the product or service, which increases the possibility of his/her other expectations and wishes;
  - Customer personality - personality characteristics of the customer, e.g. a combination of indecisive nature with low self-confidence. This characteristic may result in a greater susceptibility to post-purchase non-compliance and consequently increased search of other product or service alternatives.

Recent research in this area (Lin, CC and Lai, FY (2020)) points to the existence of a relationship between the customer's insensitivity to customer benefits and the customer's overall perception of service quality.

Services have become an integral part of human existence. Their consumption is necessary for the existence of man and is a condition for his/her further development. They satisfy the full range of his/her needs. Experts agree on several characteristics of services that are linked to specific categories of services. They are useful features that make up their utility value and that could meet customer needs. The service is produced and provided to meet the needs of non-producers. They are products of labour that are useful other way than the creation of material goods. The production of services is currently one of the most important areas of economic development in developed countries. The provision of the service cannot usually be separated in space or time, services are usually consumed at the time and place where they are produced that results from their intangibility. When providing services, live work is needed above all, the results of this work are consumed in the provision. Services are one of the important components of living standards. They arose as an accompanying phenomenon of the production of many material goods. They make it possible to increase consumption, satisfy the higher needs of man and society. They gradually replace several material goods (Mateides and Dado, 2002).

Postal services are services provided for the purpose of delivering a postal item, namely the collection and distribution of a postal item (Act No. 324/2011). A postal service is not the creation of a postal item if the created postal item is not distributed by the person who created it or if, after creation, the postal item is handed over by the sender on behalf of the sender to the postal undertaking. The postal service is also not the transport of postal items if it is performed by a person who does not collect, sort or deliver and self-deliver for these postal items.

The universal service is the offer of postal services that serves to ensure the minimum satisfaction of the needs of all users of postal services in Slovakia to ensure the availability of access points of the public postal network and contact points of the public postal network under the same conditions, in the specified quality and price, each working day with at least one pick-up and delivery per day. The universal service provider is one or more postal undertakings. This provider is obliged to provide universal service on the basis of a postal license and under the conditions and in the manner specified by the relevant law. The universal service includes: collection and distribution of postal items weighing up to and including 2 kg; collection and distribution of parcels; collection and distribution of packages weighing up to and including 10 kg; distribution of packages weighing up to and including 20 kg, if they have been selected abroad by a foreign universal service provider; collection and distribution of registered items and insured items; collection and distribution of official consignments; services connected with registered postal items at most within the scope of additional services according to the rules for international postal services and return of the found postal item to the sender.

The services of Slovak Post are provided by leading providers of modern communication, distribution and payment services on the domestic market, with created logistics conditions for doing business in Central and Eastern Europe. It is a trusted mediator that meets the changing needs of customers and offers new products and comprehensive solutions with added value and high-quality service (www.posta.sk).

Slovak Post has been operating in the postal services market for over twenty years. It currently provides a wide portfolio of services. These include, in particular, relocation services (letter items, parcels), money services, procurement services, business services, services for telecommunications operators, e-government services, POSTshop, other services (newspaper and magazine subscriptions, TIPOS, postal folders, collection rides, customs negotiation of consignments, copying services, advertising services), postal philatelic service, personalized stamps (My stamp).

2. The analysis of the current situation in the environment of the national postal operator

The most important requirement of postal customers for the services provided is their quality. Quality is an important aspect that has come to the attention of postal service providers long time ago. The quality of postal services serves as a basic tool of the postal company to maintain and increase competitiveness in the market.

The quality is expressed as the conformity of correctly defined requirements that satisfy customer needs. The definition of the quality of postal services emphasizes the goal of quality of service, in which the needs and expectations of customers are met through a price that represents the value of the service. As with other service providers, the reasons for interest in quality issues in mail are defined according to several aspects.

In summary: competitive pressures between competing companies in the postal market, the demands of postal customers, rapid technological developments in the postal sector, customer expectations are constantly increasing, quality increases market success and leads to profitability, quality improves postal market image and reputation, massive education in the field of rights protection of postal company customer rights, stricter regulation of quality of postal services, introduction of quality management systems in postal company, positive benefits in growth of labor productivity, cost reduction, system planning orientation, human potential development, increasing knowledge of postal employees and a friendly environment within the postal company.

Improving the quality of postal services represents achieving a better level of quality compared to the previous state. The evaluation of customer satisfaction of postal companies consists in the application of various methods of measuring quality. The selected methods of quality measurement should be optimal for the postal company in terms of suitability for their use and should meet all the given requirements. Therefore, it is necessary to evaluate the quality measurement methods themselves.

Each method of measuring the quality of services has its specific features, which evaluate the specific features of the provided postal service. These aspects concern: time availability, availability of contact and access points, security during the relocation process, staff expertise, affordability of postal services, waiting time at post offices, handling of complaints and grievances and information on postal services (Diabelkova, 2013).

Other repeatedly used method of measuring customer satisfaction in the post includes the test customer method - Mystery shopping. This method is implemented through trained persons who are not real customers, but "play" directly in the operation the role of a real customer and evaluate the verbal and non-verbal communication of first contact employees, their expertise and other important aspects. Customer satisfaction with Slovak Post is also determined based on the implementation of primary quantitative research, carried out by the method of questioning. Respondents can express their satisfaction or dissatisfaction with postal services with their answers. The data is obtained by directly contacting a randomly selected customer at the post office. The survey is carried out by an external institution. Another method is the End to End Method, which is one of the non-electronic methods for monitoring the quality of postal services. It is focused on determining the time of the relocation process of several types of shipments.

In order to continuously improve the quality of universal service, the regulatory authority in the quality requirements prescribes the universal service provider to ensure the measurement of customer satisfaction with the quality of universal service. Table 1 presents the results of measuring customer satisfaction with the quality of the universal postal service in 2012–2018 (Diabelkova, 2016).

Table 1: Results of measuring customer satisfaction in 2012 –2018 (%)

Postal service quality indicator	2012	2013	2014	2015	2016	2017	2018
Adequacy of fees - letters			63,3	55,9			
Adequacy of fees - packages	66,5	61,5	62,2	53,3	60,6	75,5	76,0
Location and availability of post offices	81,9	79,0	75,1	78,0	83,4	90,0	90,0
Providing product information	79,5	76,6	72,0	73,8	85,6	93,0	93,0
Range of hours for the public - in the morning	83,2	81,4				94,0	93,0
Range of hours for the public - afternoon	79,0	76,0	74,6	76,8	83,9	92,0	91,0
Complaints handling	65,6	61,2	-	64,3	70,2	84,0	77,0
Ensuring the collection of notified consignments	77,9	77,4	75,5	74,1	84,1	85,0	88,0
Waiting time at the compartment	56,0	55,0	67,8	64,4	66,6	75,0	75,0
Overall satisfaction	**73,3**	**72,3**	**74,1**	**76,5**	**78,6**	**79,0**	**79,6**

Source: Diabelkova, 2016

The customer satisfaction measurement is performed once a year on a sample of at least one thousand customers. 1 050 respondents were questioned in the study on a sample in 2018. The reasons for dissatisfaction are analysed and measures are taken to eliminate the causes of dissatisfaction (see web page of *Regulatory Authority for Electronic Communications and Postal Services,* www.teleoff.gov.sk).

The results of the measurement of transit times in national postal services shall be published on the website of the regulatory authority. An overview of the results of measuring customer satisfaction and selected quality indicators in 2011 - 2018 (expressed as a percentage) can be found in Table 2. The universal service provider shall submit to the regulatory authority, in accordance with the Universal Service Quality Requirements, a methodology for ascertaining data on customer satisfaction with the provision of universal service.

Table 2: Results of measuring customer satisfaction with the quality of universal service

Individual quality criteria	Year / measurement results in%							
	2011	2012	2013	2014	2015	2016	2017	2018
Adequacy of postal fees	65,0	66,5	61,5	62,8	54,6	60,6	75,5	76,0
Ensuring the security of postal items	79,9	80,2	76,8	X	X	X	X	X
Ease of use of products - List	86,7	88,7	86,4	X	X	84,4	93,0	96,0
Ease of use of products - Package	80,1	84,2	81,5	X	X	84,4	91,0	95,0
Ease of use of products - PP	77,5	84,9	83,2	X	X	84,4	92,0	95,0
Location and availability of post offices	81,9	81,9	79,0	75,1	78,0	83,4	90,0	90,0
Behavior of employees - behind the compartment	78,2	83,9	83,3	78,2	81,3	88,2	93,0	93,0
Behavior of employees - deliverers	83,6	86,6	87,2	79,6	82,0	90,3	95,0	95,0
Providing product information	78,2	79,5	76,6	72,0	73,8	85,6	93,0	93,0
Providing product information on the SP website	X	X	X	68,2	74,8	85,5	91,0	93,0
Range of hours for the public - morning	83,6	83,2	81,4	74,6	76,8	83,9	94,0	93,0
Range of hours for the public - afternoon	75,8	79,0	76,0	74,6	76,8	83,9	92,0	91,0
Time and frequency of mailbox retrieval	73,9	76,9	74,0	X	X	X	X	X
Complaints handling	81,5	65,6	61,2	50,6	64,3	70,2	84,0	77,0
Ensuring the collection of notified consignments	74,7	77,9	77,4	75,5	74,1	84,1	85,0	88,0
Waiting time when picking up the shipment	64,4	56,0	55,0	67,8	64,4	66,6	75,0	75,0
Overall satisfaction	**76,0**	**73,3**	**72,3**	**74,1**	**76,5**	**78,6**	**79,0**	**79,6**

From the Table 2, is it clear that the goal of the postal operator, in the form of constantly achieving a higher quality of services provided in the selected category (universal postal service), has been increasingly fulfilled over the years.

However, such a goal is presented in the works of authors around the world in various areas of research. Giacomel, Cardoso and Santo (2019), deals with a proposal for measuring customer satisfaction in e-commerce, where these authors discover a "gap in the methodology capable of measuring customer satisfaction" in online shopping. They filled this gap with a design using elements of the SERVQUAL and SERVPERF methods, the Brazilian Quali Quanti model and national barometers for measuring service quality - Swedish, American and European.

3. Material and methodology

The aim of the paper is to diagnose customer satisfaction with postal products in selected areas in the Slovak Republic through the chosen methodology that the researchers consider to be effective and suitable for its application. Subsequently, in response to the stated diagnostic statements, to design framework therapeutic procedures in the environment of the postal company, in order to achieve the fulfilment of customer requirements and to achieve and maintain their loyalty.

The scientific methods used in this paper are clearly based on the application of analytical (including multidimensional analysis), synthetic and comparative methods that also represent recommended methods in the application of diagnostics and subsequently therapeutic methods in determining satisfaction with the quality of postal services. Separately, but at the same time compatible, the use of another method, the so-called Kano model is presented. Through this model, the diversity of customer requirements is emphasized according to their importance for achieving their satisfaction. It is based on the existence of two key dimensions of quality, which are: "the degree of fulfilment of customer requirements" and "the degree of customer satisfaction".
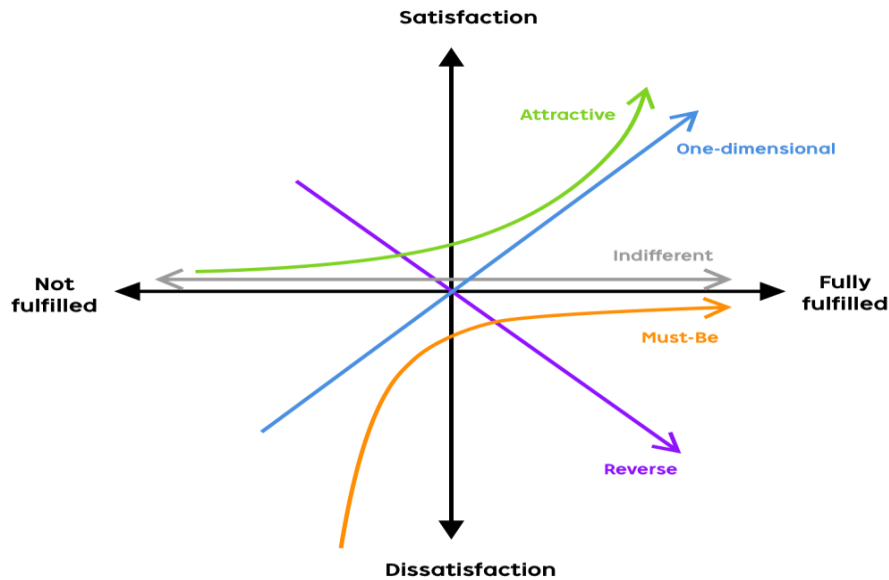
Fig. 1. Kano model of customer satisfaction

Source: Krnacova, P., Lesnikova, P. 2012

The Kano model (see Fig. 1) expresses the relationship between the degree of customer satisfaction and the attributes of quality through 5 categories of perceived quality by customers. These are: attractive, one-dimensional, mandatory, insignificant and contradictory attributes of products that create quality. In line with the product life cycle, these categories of perceived quality change. They range from the category of insignificant, through attractive, one-dimensional to mandatory quality attributes. This means that while at this point the customer may find a certain quality attribute attractive, it may be considered mandatory in the future. However, these rules may not apply to all products. It is more important to realize that the perception of individual categories changes over time. At the same time, attractive quality attributes clearly lead to customer satisfaction (Chen et al. 2010).

Based on the information above, the individual categories of product or service requirements that affect customer satisfaction can be characterized as follows:
- attractive requirements (A - attractive) - have a clear impact on customer satisfaction because these requirements the customer does not expect. At the same time, it logically follows that failure to meet these requirements will not lead to customer dissatisfaction;
- one-dimensional requirements (O - one-dimensional) - represent those quality attributes, the fulfilment of which leads to customer satisfaction and in case of non-fulfilment, the customer is dissatisfied. There is a direct linear relationship between meeting these requirements and customer satisfaction, e.g. the higher the compliance rate, the more satisfied the customer;
- mandatory requirements (M - must-be) - the customer takes them for granted, he automatically expects them. They can also be described as basic, which means that their fulfilment will be reflected in customer satisfaction, and at the same time, if they are not met, the customer will be very dissatisfied; as the customer takes these requirements for granted, he does not deal with them if they are met. The identification of the basic requirements is important mainly because the customer is immediately aware of their absence that will ultimately result in his/her maximum dissatisfaction;

817

- insignificant requirements (I - indifferent) - do not affect satisfaction in any way, customer dissatisfaction included; these are attributes that are not critical to the customer and he does not care whether they are met or not;
- conflicting requirements (R - reverse) - represent such quality attributes for which it is true that the higher the rate of their fulfilment, the more significantly the customer dissatisfaction grows (Chen et al. 2010).

In addition to the above 5 categories of product or service requirements, when compiling the Kano model, we may also encounter another category – ambiguous requirements (Q – questionable). A request included in this category expresses a problematic result as it usually indicates a certain problem, which is related either to incorrectly formulated questions or to the respondent's misunderstanding of the question. To include the request in this category, it would mean that the respondent answered in the same way for positive and negative. Under normal circumstances, no requirement should be assessed in this category.

The Kano model represents a diagnostic approach that is relatively popular in important professional publications and its use brings the desired results of research in various fields. Bi, JW. Liu, Y., Fan, ZP and Cambria, E. (2019) applied the Kano model in modeling customer satisfaction from online reviews using a neural network model. The result of this study was, among other things, a very accurate identification of the dimensions of customer satisfaction. Similarly, Madzík et al. (2019) applied the Kano model to better understanding of customer requirements in higher education. "Practice orientation" and "quality resources" have proven to be the most stable student requirements, while "quality staff" is the least stable.

The most direct requirement, a requirement that has the same effect on satisfaction and dissatisfaction, is an "innovation orientation". "Research orientation" is one of the attractive requirements. An interesting outcome is that "ethical orientation" shows weak relationships between positive and negative reactions of students. It is also surprising that "skills orientation" has proved to be too general a requirement and could be classified as one in which students show indifference (Madzik et al. 2019). Al-Dulaimi (2017) also contributed to this area of research, presenting a comparison of education, educational services and student satisfaction between selected countries with the rather surprising differences that emerged from the research results. Zhang (2019), who also used of the Kano model, conducted research on improving the quality of services of logistics companies, including postal companies that are the subject of research in our paper. The research presented by Zhang (2019) pointed to the so-called necessary quality of logistics services that includes the so-called first mile (delivery), timeliness and method of delivery, security of the shipment and convenient method of payment for these services. Another methodology that was used to address the issue is primary research. The research activities that led to the specific identification of the requirements defined in the Kano model in selected regions of Slovakia were based on primary quantitative research, where it was necessary to proceed with the correct definition of the sample of respondents in order to achieve the required reliability of research results. This reliability of the results and the possibility of other solutions affects the sample size. The sample size from 100 to 200 respondents can be considered an enough degree of accuracy, regardless of the size of the basic sample examined. Such many respondents satisfy the so-called normal probability distribution. We used a statistical method to calculate the sample size. The sample size is influenced by three basic factors (Foret, M., Stávková, J. 2003):

- Reliability of the estimate ($z_{1-\alpha}$ / 2) - usually ranges from 95% to 99%. The higher the reliability of the estimate is required, the larger the sample size. Its tabular critical value of the normalized distribution is inserted into the formula.
- Maximum allowable error range (H) - the range is usually in the range of $\pm$ 0.02 to $\pm$ 0.1. The smaller the error is tolerated, the larger the selection must be made.
- Variability of the base file or proportion of the character (p) - if this value is not specified, the value 0.5 will be used.

Sample sizes were calculated using the following formula (Foret and Stavkova, 2003):

$$n = \frac{z_{1-\alpha/2}^2 * \sigma^2}{H^2}$$

$$\sigma = \sqrt{p * q} = \sqrt{p * (1 - p)}$$

where the calculated variables represent:

n – minimum number of respondents;

z$_{1-\alpha/2}$ - critical value;

σ2 – variance calculated from the standard deviation;

p – variability of the basic set,

H – maximum permissible error range.

For the calculation of the sample of respondents, a 99% reliability of the estimate was determined, the critical value of which determined from the tables is 2.58; maximum permissible error range ± 0,1 and character ratio 0,5. Calculated values that were determined above where filled into the formula, so the sample for the district of Poprad was calculated as follows:

$$\sigma = \sqrt{0,5 * (1 - 0,5)} = \sqrt{0,25} = 0,5$$

$$n = \frac{2,58^2 * 0,5^2}{0,10^2} = \frac{1,6641}{0,01} = 166,41 = 167$$

The calculations show that the minimum sample size is 167 respondents for the district of Poprad. A similar recalculation was performed for the districts of Dolný Kubín (205 respondents), Martin (206 respondents) and Považská Bystrica (340 respondents) where this research activity also took place.

4. Results

4.1 Requirements categorization for postal services of Slovak Post in selected regions

Based on the evaluation of individual requirements in the Kano model, the answers of the respondents were divided into questions formulated positively and negatively into the relevant categories set by the Kano model. The meaning of individual categories is: "M" - mandatory requirement; "O" - one-dimensional request; "A" - an attractive requirement; "I" - insignificant requirement; "Q" - ambiguous requirement and "R" - conflicting requirement. The rule that M> O> A> I was applied in the evaluation of the requirements.

The summarized results of marketing research in individual districts are shown in Table 3.

Table 3: Customer requirements for postal services by importance in the listed regions.

Region	A	Rel. ab.	O	Rel. ab.	M	Rel. ab.	I	Rel. ab.
Dolny Kubin	Opening hours in the afternoon	**24,4**	Waiting time at the compartment (< 15 min)	25,8	Reasonable charges for postal services	31,1	Availability and distribution of post offices and mailboxes	35,1
	Openning hours during weekend	**28,4**					Use of self-service facilities at the post office	32,9
	Letters and parcels processing 24/7	**32,9**					Payment by credit card	34,2
							Use of self-service facilities in the shopping center or publicly available place	34,7

Martin	Opening hours during afternoon (after 3pm)	**28,6**	Availability and distribution of post offices and mailboxes	39,1	Waiting time at the compartment (<12 min)	64,3	Reasonable fees for services provided	34,3
	Openning hours during weekend	**52,0**	Employees behavior	28,6	Security of shipment delivery	40,5	Informativeness of provides services	32,4
					Handling of complaints and grievances	51,4		
Poprad	Openning hours during weekend	**46,63**	Security of shipment delivery	69,10	Postal service fees	58,43	Availability of post offices and branch mailboxes	41,6
							Parking spots nearby	37,1
					Willingness and helpfulness of employees.	53,93	Informativeness of provides services	38,8
	Opening hours during afternoon (after 3pm)	**43,26**	Waiting time at the compartment	65,17			Electronic services offer	33,2
					Handling of complaints and grievances	44,38	Post office interior	46,1
							Identification of employees by logo	38,2
Povazska Bystrica	Opening hours during afternoon	**42,90**	Security of shipment delivery	64,6	Waiting time at the compartment (<12 min.)	47,8	Reasonable fees for services provided	40,9
							Parking spots nearby	37,4
	Openning hours during weekend	**36,23**	Willingness and helpfulness of employees.	53,3			Identification of employees by logo	34,5
							Informativeness of provides services	34,5
	Electronic services portfolio	40,00	Handling of complaints and grievances	82,6			Availability and distribution of post offices	48,4
							Reserved seating area	31,0

Source: own processing

From the Table 3 that determines the order of requests for postal services according to their importance in the region of Dolny Kubin, it is clear that the most important for respondents is the attractive requirement opening hours during afternoon, followed by opening hours during the weekend and sending letters and parcels 24/7. In the Martin region, an attractive requirement for respondents is the post office opening hours during afternoon, specifically after 3 pm and the opening hours during the weekend. In the Poprad region, respondents identified "reasonable postal service fees" as the most important requirement and "identification of employees by logo" as the least important. In the Povazska Bystrica region, the most important attractive requirement for respondents is the opening hours during afternoon and during the weekend and they are also interested in the portfolio of electronic services.

4.2 Diagnosis of the obtained examination results by categorization

In general, when conducting primary quantitative research, summarizing the whole data set obtained gives us a global view of the subject of research, in our case the requirements for the quality of postal services, but does not answer the question of respondent's expectations that should be met. The diagnostic procedure that is chosen in this part of the presented article consists in categorizing the obtained data using multidimensional analysis. The second level categorization represents the filtering of answers to research questions depending on the gender of the respondents, i. j. for men (m) and for women (w) who were in the position of respondents. The presentation of this diagnostic procedure was performed on data obtained by primary research in the district of Poprad. (Tab. 4). The diagnostic procedure chosen in this part of the presented article consists in categorizing the obtained data using multidimensional analysis. The second level categorization represents the filtering of answers to research questions depending on the gender of the respondents, for men (m) and for women (w). The presentation of this diagnostic procedure was performed on data obtained by primary research in the Poprad region (Tab. 4).

Table 4: Categorization of requirements for the quality of postal services according by the gender of the respondents

Requirements for postal services in the Poprad region	Requirements category												Summary			Divided by gender	
	M		O		A		I		Q		R						
	m	w	m	w	m	w	m	w	m	w	m	w	m	w	total	m	w
Adequacy of postal fees	**32**	**36**	15	30	3	6	31	24	0	0	1	0	82	96	178	**M**	**M**
Opening hours - afternoon	9	13	19	**31**	**34**	28	20	24	0	0	0	0	82	96	178	**A**	**O**
Opening hours - weekend	10	12	15	17	**41**	**34**	16	33	0	0	0	0	82	96	178	**A**	**A**
Waiting time at the compartment	7	13	**39**	**44**	20	25	16	13	0	0	0	1	82	96	178	**O**	**O**
Availability of post offices and mailboxes	15	29	**32**	18	5	8	30	**41**	0	0	0	0	82	96	178	**O**	**I**
Post office interior	8	11	16	24	16	10	**42**	**51**	0	0	0	0	82	96	178	**I**	**I**
Parking spots nearby	9	7	**39**	20	14	21	20	**48**	0	0	0	0	82	96	178	**O**	**I**
Willingness and helpfulness of employees	**30**	**39**	27	37	9	9	16	11	0	0	0	0	82	96	178	**M**	**M**
Identification of employees by logo	5	6	14	19	8	4	**55**	**67**	0	0	0	0	82	96	178	**I**	**I**
Informativeness of provides services	20	37	9	11	7	6	**46**	**42**	0	0	0	0	82	96	178	**I**	**I**
Security of shipment delivery	10	16	**52**	**54**	13	15	6	11	1	0	0	0	82	96	178	**O**	**O**
Handling of complaints and grievances	27	**47**	**30**	17	5	10	19	22	0	0	1	0	82	96	178	**O**	**M**
Electronic services offer	15	10	7	11	4	7	**56**	**68**	0	0	0	0	82	96	178	**I**	**I**

Source: Diabelkova, M. 2016

Diagnostic statement number 1: Gender quality requirements for postal services differ in four categories. Requirement "Opening hours of the Slovak Post during afternoon "is included in the men's segment as attractive but women described it as one-dimensional. In the case of the requirements "Availability of post offices and post boxes" and "Parking spots nearby", men classified them as one-dimensional requirements and women as insignificant. Men stated "Handling of complaints and grievances" as one-dimensional requirement and women in mandatory requirements category.

In another two-level categorization, the relationship between the requirements for the quality of postal services and the residence of the respondents was examined, residing in the city of Poprad (PP) or outside the city of Poprad (outside PP) (Table 5).

Table 5: Categorization of requirements for the quality of postal services according to the residence of respondents

Requirements for postal services	M		O		A		I		Q		R		Summary			Result by residence	
	PP	Outside PP	PP	Outside PP	PP	Outside PP	PP	Outside PP	PP	Outside PP	PP	Outside PP	PP	Outside PP	☐	PP	Outside PP
Adequacy of postal fees	**32**	**36**	30	15	4	5	25	30	0	0	0	1	91	87	178	M	M
Opening hours during afternoon	12	10	27	23	**30**	**32**	22	22	0	0	0	0	91	87	178	A	A
Opening hours during weekends	11	11	15	17	**45**	**30**	20	29	0	0	0	0	91	87	178	A	A
Waiting time at the compartment	13	7	**43**	**40**	21	24	13	16	0	0	1	0	91	87	178	O	O
Availability of post offices and mailboxes	24	20	18	**32**	4	9	**45**	26	0	0	0	0	91	87	178	I	O
Post office interior	10	9	19	21	10	16	**52**	**41**	0	0	0	0	91	87	178	I	I
Parking spots nearby	12	4	**35**	24	18	17	26	**42**	0	0	0	0	91	87	178	O	I
Willingness and helpfulness of employees	**41**	28	33	**31**	10	8	7	20	0	0	0	0	91	87	178	M	O
Identification of employees by logo	7	4	15	18	6	6	**63**	**59**	0	0	0	0	91	87	178	I	I
Informativeness of provides services	20	**37**	11	9	5	8	**55**	33	0	0	0	0	91	87	178	I	M
Security of shipment delivery	10	16	**56**	**50**	17	11	7	10	1	0	0	0	91	87	178	O	O
Handling of complaints and grievances	**45**	29	27	20	10	5	9	**32**	0	0	0	1	91	87	178	M	I
Electronic services offer	12	13	10	8	6	5	**63**	**61**	0	0	0	0	91	87	178	I	I

Source: Diabelkova, M. 2016

Diagnostic statement number 2: Respondents' requirements differ in five categories of postal service quality requirements. "Availability of post offices and post boxes" was determined by respondents who live outside the city of Poprad as a one-dimensional requirement but they who live in the city marked it as insignificant. "Parking spots nearby" was identified by respondents from the city of Poprad as a one-dimensional requirement, respondents living outside the city considered it as insignificant. "The willingness and helpfulness of employees" respondents living in the city of Poprad marked as mandatory but respondents living outside the city marked it as a one-dimensional requirement. "Informativeness of provides services" respondents living in the city identified it as insignificant but respondents whose residence is outside the city of Poprad marked this requirement as mandatory. "Handling of complaints and grievances" was identified by respondents from the city as a mandatory requirement but respondents living outside the city identified it as insignificant.

Subsequently, the relationship of individual requirements for the quality of postal services with the age categories of respondents was diagnosed through a two-level categorization. The age categories of the respondents were divided into five groups (Table 6). Evaluating this research, we know the sample is not properly stratified, so the same number of respondents was not reached in the individual segments. Despite this fact, the explanation of the research results is considered adequate.

Table 6: Categorization of requirements for the quality of postal services according to the age of respondents

Requirements category	Age	Adequacy of postal fees	Opening hours during afternoon	Opening hours during weekend	Waiting time at the compartment	Availability of post offices and mailboxes	Post office interior	Parking spots nearby	Willingness and helpfulness of employees	Identification of employees by logo	Informativeness of provides services	Security of shipment delivery	Handling of complaints and grievances	Electronic services offer
M	18 - 29	**17**	8	3	5	**19**	2	2	11	0	13	6	**20**	13
	30 – 39	11	4	5	4	10	3	3	**14**	2	**16**	7	**14**	6
	40 – 49	10	5	7	5	6	3	4	**16**	3	11	3	**17**	4
	50 – 59	**14**	2	4	4	3	2	4	10	2	9	6	7	2
	60 and more	**16**	3	3	2	6	9	3	**18**	4	8	4	**16**	0
O	18 - 29	6	**12**	10	**16**	8	4	**13**	**14**	2	3	**22**	5	10
	30 – 39	**10**	11	7	**18**	11	6	**14**	11	2	5	**20**	11	5
	40 – 49	11	11	5	**15**	14	11	13	**16**	6	5	**22**	14	3
	50 – 59	8	8	6	**13**	10	6	9	**11**	9	2	**15**	9	0
	60 and more	10	8	4	**21**	7	**13**	10	12	**14**	5	**27**	8	0
A	18 - 29	1	**12**	**18**	11	2	4	11	3	0	3	6	2	4
	30 – 39	3	**13**	**18**	6	1	4	8	5	0	2	5	3	3
	40 – 49	2	**15**	**18**	15	4	5	6	2	3	2	9	2	3
	50 – 59	1	**12**	**12**	4	2	5	4	3	3	4	5	3	1
	60 and more	2	10	9	9	4	8	6	5	6	2	3	5	0
I	18 - 29	12	4	5	4	7	**26**	10	8	**34**	17	2	9	9
	30 – 39	**10**	6	4	6	**12**	21	9	4	**30**	11	2	6	**20**
	40 – 49	**18**	10	11	6	**17**	22	18	7	**29**	23	6	8	**31**
	50 – 59	6	7	7	8	**14**	16	12	5	**15**	14	3	10	**26**
	60 and more	9	**17**	**22**	5	**21**	8	**19**	3	14	**23**	4	8	**38**
R	18 - 29	0	0	0	0	0	0	0	0	0	0	0	0	0
	30 – 39	0	0	0	0	0	0	0	0	0	0	0	0	0
	40 – 49	0	0	0	0	0	0	0	0	0	0	0	0	0
	50 – 59	0	0	0	0	0	0	0	0	0	0	0	0	0
	60 and more	1	0	0	1	0	0	0	0	0	0	0	1	0
Q	18 - 29	0	0	0	0	0	0	0	0	0	0	0	0	0
	30 – 39	0	0	0	0	0	0	0	0	0	0	0	0	0
	40 – 49	0	0	0	0	0	0	0	0	0	0	1	0	0
	50 – 59	0	0	0	0	0	0	0	0	0	0	0	0	0
	60 and more	0	0	0	0	0	0	0	0	0	0	0	0	0
Summary	18 - 29	36	36	36	36	36	36	36	36	36	36	36	36	36
	30 – 39	34	34	34	34	34	34	34	34	34	34	34	34	34
	40 – 49	41	41	41	41	41	41	41	41	41	41	41	41	41
	50 – 59	29	29	29	29	29	29	29	29	29	29	29	29	29
	60 and more	38	38	38	38	38	38	38	38	38	38	38	38	38
Category	**18 - 29**	**M**	**OA**	**A**	**O**	**M**	**I**	**O**	**O**	**I**	**I**	**O**	**M**	**M**
	30 – 39	**OI**	**A**	**A**	**O**	**I**	**I**	**O**	**M**	**I**	**M**	**O**	**M**	**I**
	40 – 49	**I**	**A**	**A**	**OA**	**I**	**I**	**I**	**MO**	**I**	**I**	**O**	**M**	**I**
	50 – 59	**M**	**A**	**A**	**O**	**I**	**I**	**I**	**O**	**I**	**I**	**O**	**I**	**I**
	60 and more	**M**	**I**	**I**	**O**	**I**	**O**	**I**	**M**	**OI**	**I**	**O**	**M**	**I**

Source: Diabelková, M. 2016.

Diagnostic statement number 3: There was a large difference in the requirements of respondents in different age categories. Only in the requirement "Security of shipment delivery", respondents of all ages did agree that it is a one-dimensional requirement. "Opening hours during weekend" was marked by the age group over 60 as an insignificant requirement but other age groups marked it as attractive. The age category from 18 to 29 years stated the requirement "Availability of post offices and mailboxes" as mandatory but all other age categories identified it as insignificant. "Post office interior" was described by the first four groups as insignificant but the category of 60 years and older respondents considers it as one-dimensional. The age category from 30 to 39 years determined "Informativeness of provides services" as a mandatory requirement but the other groups classify it as an insignificant requirement. All categories clearly consider "Security of shipment delivery" as a mandatory requirement but in 50-59 years old category, respondents have identified it as irrelevant. In the categorization of requirements, we have included "Electronic services offer" between the insignificant requirements but the age group 18-29 years has determined this requirement as mandatory.

4.3 Therapeutic procedures based on the obtained research results

If diagnostic procedures determine the extent to which the characteristics of the postal service affect their perceived quality, how individual satisfaction (M), one-dimensional (O) and attractive requirements (A) for the quality of postal services affect customer satisfaction and what is the evaluation of postal services from customers' point of view compared to the competition, the postal company is expected to develop a portfolio of procedures to ensure customer satisfaction. The highest priority for ensuring the satisfaction of the postal company's customers is those customer requirements for the postal service that the customer considers to be the most important. However, it is also necessary to pay attention to those requirements that show insignificance (I), ambiguity (Q) and even contradiction (R).

Within the framework of therapeutic procedures, it is possible to recommend the examination of several dimensions that could contribute to the clarification and, in a way, to the influence of the quality of postal services. These are the following dimensions:

- adjustment and implementation of innovative changes in the environment that affect the mail customer - the acceptability of the environment in providing postal services, including own premises, surroundings, equipment (including self-service boxes, applications, etc.), as well as behaviour of employees during the first contact;
- increasing the reliability of the provided postal services - increasing the ability to provide the required postal service with all the quality features that the operator can provide;
- increasing the sensitivity of the approach to the customer - increasing the willingness and flexibility with which the first contact employee will be able to solve customer problems;
- increasing the qualification of postal employees by achieving competencies for the implementation of relevant processes in the provision of services - professional knowledge, courtesy, trustworthiness of employees;
- empathy with the individual wishes of the customer - readiness and sensitivity to the individual wishes of the customer, which can be fulfilled from the point of view of technology, law and security;
- periodic examination of the causes of "incomplete quality" of the provision of postal services by defining the so-called "5 gaps" where the following differences are identified:
  - difference 1: between customer expectations and the understanding of these expectations by the management of the postal company;
  - difference 2: between management of the postal company and understanding of customer expectations and their enforcement in the specifics of postal services;
  - difference 3: between the specifications for the provision of the postal service and the actual performance of the employees of the postal company (insufficient qualification of employees, incorrectly implemented internal quality management system, problems in enforcing teamwork, etc.);

- difference 4: between the declared and actual provision of the postal service;
- difference 5: between the customer's expectations and the customer's experience with the provision of postal services (comparison of the expected and desired service with reality).

Discussion and conclusion

The professional community has taken the idea that if there is nothing to discuss in a issue, there is no reason to write such a contribution. Therefore, if we understand customer satisfaction, which we dealt with in the article, as the result of a complex psychological comparison process during which the customer compares his/her own experience after providing the service, there are many questions to discuss on this issue. First of all, it is about understanding the great complexity of personal feelings (pleasure or disappointment) that result from his/her personal comparison of the actual performance in the provision of postal services with the expected one. In case of dissatisfaction and failure to meet expectations, competing postal companies get a chance. So, can we cover all the psychological aspects of customer decision-making through the most used methods of measuring customer satisfaction and knowing their requirements so far? It could also be a stimulus to discuss how it is possible and explainable that there are certain differences between the requirements for the quality of postal services in individual regions of Slovakia and how this fact should be reflected in the strategic decision-making of the postal company.

Focusing on customer satisfaction represents the strategy of the postal company in the long term and in investing in a wide range of activities aimed at current and future customers. So, is the postal company's strategy for finding ways to increase customer satisfaction clearly defined? If so, how is it necessary to innovate for the next period, with the dominance of the use of information and communication technologies? What form should build relationships with customers in the so-called the digital age?

The whole spectrum of topics for discussion, in connection with the topic of the paper, can be presented in connection with the transfer of a "satisfied customer" to the position of a "loyal customer". It is generally true that loyalty, often referred to as customer loyalty, is the result of customer satisfaction. For the customer to be loyal, the postal company's product strategy must be reworked as precisely as possible, because the customer must be firstly satisfied with the product that the postal company creates.

The issue of certain differences that emerged as the results of research activity within the examined regions also appears to be a well-founded area that provokes discussion. For example, the requirement "Availability of post offices and post boxes" was determined by respondents who live outside the city of Poprad as one-dimensional but they who live in the city marked it as insignificant requirement. "Parking spots nearby" respondents from the city of Poprad identified as a one-dimensional requirement, respondents living outside the city considered it as insignificant. "The willingness and helpfulness of employees" respondents living in the city marked as mandatory and respondents living outside the city marked it as a one-dimensional requirement. "Informativeness of provides services" respondents living in the city identified as insignificant but respondents whose residence is outside the city of Poprad marked this requirement as mandatory. "Handling of complaints and grievances" was identified by respondents from the city as a mandatory requirement but respondents living outside the city identified it as insignificant. These diagnostic statements could then be examined in more detail, as each region has relatively significant specifics in the area of district population and thus is likely to differ in identifying their requirements for the quality of postal services. This phenomenon is still widely studied around the world today (Rosillo-Diaz, E et al. (2020)). The results of their research showed a significant impact of cultural dimensions on the quality of products and services, measured by identifying several types of risk associated with this type of trade.

Loyal customers are very interesting for the postal company, because it is they who will spread the information about the quality of the provided postal service further, and thus the postal company can gain more customers

and build a very positive image in the postal services market. In a postal company, it is not enough just to understand the importance of customer satisfaction, respectively consequences of their dissatisfaction, but appropriate measures must also be taken. By this we mean the quantitative and qualitative survey and measurement of customer satisfaction in order to have adequate data and information. Without effective customer satisfaction assessment and evaluation, it is unlikely that the management of a postal company will make and implement decisions that would make it possible to retain the customer more effectively.

References

Act No. 324/2011 Coll on Postal Services and on Amendments of Certain Acts. 2011. Zákon č. 324/2011 zo 14. septembra 2011 o poštových službách a o zmene a doplnení niektorých zákonov. Retrieved from https://www.teleoff.gov.sk/sprava-o-stave-poskytovania-univerzalnej-sluzby-a-postoveho-platobneho-styku/

Al-Dulaimi, ZYS. 2017. Education, educational services and students' satisfaction - comparative study between Romanian and Iraqi universities . *Proceedings of the international conference on business excellence*. 11. 1. 482-492. DOI: 10.1515/picbe-2017-0052.

Alam, SS; Ali, MH; Omar, NA; Hussain, WMHW. 2020. Customer Satisfaction in Online Shopping in Growing Markets: An Empirical Study**.** *Journal of asian business and information management*. 11. 1. 78-91. DOI: 10.4018/IJABIM.2020010105.

Bi, JW; Liu, Y; Fan, ZP; Cambria, E. 2019. Modelling customer satisfaction from online reviews using ensemble neural network and effect-based Kano model. *International journal of production research*. 57. 22. 7068-7088. DOI: 10.1080/00207543.2019.1574989.

Bostanci, B; Erdem, N. 2020. Investigating the satisfaction of citizens in municipality services using fuzzy modelling**.** *Socio-economic planning sciences*. 69. DOI: 10.1016/j.seps.2019.100754.

CHEN, L.S. et al. 2010. C-Kano Model: a Novel Approach for Discovering Attractive Quality Elements. In *Total Quality Management*. ISSN 1478-3371, 2010, Vol. 21, No. 11, p. 1189 – 1214

Diabelkova, M. 2013. *Prieskum spokojnosti zákazníkov Slovenskej pošty, a. s. s kvalitou poštových služieb vo vybranom meste:* bakalárska práca. Žilina: Žilinská univerzita v Žiline. P. 118

Diabelkova, M. 2016. *Zisťovanie spokojnosti zákazníkov s poštovými službami spoločnosti Slovenská pošta, a. s. v okrese Poprad:* diplomová práca. Žilina: Žilinská univerzita v Žiline. P. 111

Foret, M., Stávková, J. 2003. *Marketingový výzkum: jak poznávat své zákazníky.* Praha: Grada Publishing, 2003. ISBN 978-80-247-6260-9

Giacomel, Cristina & Cardoso, Janaína & Júnior, Carlos. (2019). Proposta de um instrumento para mensurar a satisfação de clientes de e-commerce. *Navus - Revista de Gestão e Tecnologia*. 105-120. DOI: 10.22279/navus.2019.v9n2.p105-120.877.

ISO 9000:2015. 2015. *Quality management systems — Fundamentals and vocabulary*. P. 51. Retrieved from https://www.iso.org/standard/45481.html

Jones, T.M. 1995. Instrumental stakeholder theory: A synthesis of ethics and economics, *Academy of Management Review*. 20(2): 404-437.

Kita, J. et.al., 2010. *Marketing*. Bratislava: Iura Edition, 2010, ISBN 978-80-8078-327- 3.

Juznik Rotar, L., Kozar, M. 2017. The Use of the Kano Model to Enhance Customer Satisfaction. *Organizacija,* Vol: 50, Issue: 4, P: 339-351, DOI: 10.1515/orga-2017-0025 Retrieved from https://content.sciendo.com/view/journals/orga/50/4/article-p339.xml

Kmeť, S. 2001. *Manažment kvality. Zabezpečovanie a zlepšovanie kvality.* Žilinská univerzita v EDIS, Žilina. P. 69

Kotler, P., Armstrong, G. 2004. *Marketing*. Praha: Grada Publishing, 2004. ISBN 80-247-0513-3.

Krnacova, P., Lesnikova, P. 2012. *Teoretické východiská Kano modelu*. Retrieved from https://encyklopediapoznania.sk/clanok/5610/teoreticke-vychodiska-kanovho-modelu

Ligasová, J. 2013. *Lojalita zákazníka a jeho hodnotenie spokojnosti v podniku služieb.* Praha. Retrieved from https://is.ambis.cz/th/janjq/Diplomova_praca_Julia_Ligasova.pdf

Lin, CC; Lai, FY. 2020. The mechanism and boundary conditions of the relationship between customer incivility and service quality. *Journal of management & organization*. 26. 2. 201-218. DOI: 10.1017/jmo.2018.82.

Madzik, P; Budaj, P; Mikulas, D; Zimon, D. 2019. Application of the Kano Model for a Better Understanding of Customer Requirements in Higher Education-A Pilot Study. *Administrative sciences*. 9. 1. DOI: 10.3390/admsci9010011.

Mateides, A. 1999. Spokojnosť zákazníka a metódy merania: koncepty a skúsenosti. Bratislava: EPOS, 1999. P. 271. ISBN 80-8057-113-9.

Mateides, A; Ďaďo, J. 2002. *Služby.* Epos, Bratislava, ISBN 80-8057-452-9

Rosillo-Diaz, E; Blanco-Encomienda, FJ; Crespo-Almendros, E. 2020. A cross-cultural analysis of perceived product quality, perceived risk and purchase intention in e-commerce platforms**.** *Journal of enterprise information management*. 33. 1. 139-160. DOI: 10.1108/JEIM-06-2019-0150.

Regulatory Authority for Electronic Communications and Postal Services 2019. [Úrad pre reguláciu elektronických komunikácií a poštových služieb.] Retrieved from https://www.teleoff.gov.sk/sprava-o-stave-poskytovania-univerzalnej-sluzby-a-postoveho-platobneho-styku/

Rostasova, M. et al. 2008. Kvalita služby vnímaná zákazníkom. Žilina: EDIS - vydavateľstvo ŽU. P. 129. ISBN 978-80-8070-894-8.

Salgovicova, J. 2005. *Marketing v manažérstve kvality.* Bratislava: STU v Bratislave. P. 202. ISBN 80-227-2288-X.

Suarez, A.V. 2015. Written communication for customer satisfaction services. *Revista de Investigación Lingüística*, nº 18 (2015); pp. 129-162 ISSN: 1139-1146 Universidad de Murcia

Slovenská pošta. Retrieved from http://www.posta.sk .

Zhang, DD. 2019. Research on Improving Service Quality of Logistics Enterprises Based on KANO Model. *Proceedings of the 2019 4th international conference on social sciences and economic development* (ICSSED 2019). Part: Advances in Social Science, Education and Humanities Research. ISBN 978-94-6252-718-8. ISSN 2352-5398. 314. 341-344 https://doi.org/10.2991/icssed-19.2019.63

Maria ROSTASOVA is the professor at the Faculty of Operation and Economics of Transport and Communications, University of Zilina, Slovakia. She is a lecturer, author, researcher and consultant, specializing in the areas of marketing, postal services technology and regional development. Her research is interested in Quality Management and Regional Development. Her publication activities involve articles, textbooks and monographs on such area. She is member of many scientific boards and professional committees.
ORCID ID: orcid.org/0000-0002-3920-5527 **ResearcherID: P-9598-2016**

Anna PADOUROVA is the researcher at the Faculty of Operation and Economics of Transport and Communications, University of Zilina, Slovakia. Her research and publication activities focus on the investigation of customers on the postal services market as well as the relations in triple helix concept in the regional conditions of The Slovak Republic.
ORCID ID: orcid.org/0000-0001-8365-8139

Tatiana COREJOVA is the Professor of Network Economics and E-commerce economics of the Faculty of Operation and Economics of Transport and Communications, University of Zilina, Slovakia. Her scientific, pedagogical and publishing activity is focused on interaction of technological development and economy and management of network industries, optimization and rationalization of postal network and services, diagnostics of business environment including diagnostics of technological procedures, research of sectoral clusters of companies and network processes knowledge of global processes in the development of information and communication technologies and transport at regional level, in the business environment, regional dimensions of the knowledge economy and the creative economy.
ORCID ID: orcid.org/0000-0003-0775-940X **ResearcherID: R-3145-2019**

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

THE INFLUENCE OF FOREIGN INVESTORS ON THE DEVELOPMENT OF POLISH ENTERPRISES – A CASE STUDY OF THE BPH BANK

Waldemar Milewicz

Warsaw School of Economics
al. Niepodległości 162, 02-554 Warsaw, Poland

E-mail: wmilew@sgh.waw.pl

Abstract. According to the definition proposed by the Organisation for Economic Cooperation and Development (OECD), foreign direct investment means investment that causes long-lasting relationships. In turn, the latter reflect an interest of an economic entity of one country in an economic entity of a country other than the country of permanent residency of the direct investor. Foreign investors do not only provide production capital in privatized companies, but most of all technical know-how and the know-how on the performed economic activity. They send their specialists who should introduce international standards in daughter companies smoothly and eliminate the previous insufficient level of performance. Due to specific "spreading" of imported know-how the effect of boosted performance also affects domestic enterprises which have not been privatized yet. In this paper, the author will demonstrate the impact of a foreign investor on the development of Bank Przemysłowo-Handlowy in Cracow. A literature review will be used for this purpose, i.e. transaction documentation and post-audit statements of the Supreme Audit Office and delegations of the Ministry of State Treasury. The picture of how Hypovereinsbank has influenced the operation of BPH after the acquisition of shares will be presented as an outcome of this review. It is, thereby, a good example of denying the popular opinion about exploitation of local employees by foreign companies.

Keywords: foreign direct investment; know-how; performance

1. Introduction

According to the definition proposed by the Organisation for Economic Cooperation and Development (OECD), foreign direct investment means investment that causes long-lasting relationships. In turn, the latter reflect an

interest of an economic entity of one country in an economic entity of a country other than the country of permanent residency of the direct investor (OECD 2008).

Foreign direct investment may be treated as capital investment. It is done outside the country the investor is resident in. Its objective is to undertake economic activity from the ground up or to acquire ownership rights to an existing enterprise, in a scale allowing direct participation in management (Karaszewski 2004).

One can also encounter definitions that present foreign direct investment in a financial approach. This approach defines foreign direct investment as a form of international capital flows (for more see: Globan 2018). It is a response to the differentiation of the level of interest rates in individual countries. Therefore, foreign direct investment is located in a country of a higher interest rate than the one established in the investor's home country (Przybylska 2001).

According to Volker Lederer the import of capital may take place, apart from direct investment, through portfolio investment. According to his interpretation, foreign investor's involvement serves solely the aims of investing capital (without having influence on the financed company) (Lederer 1998). From the investor's point of view, it is the aim of the capital investment that is of prime importance. In turn, direct investment is understood by the said author as taking over an enterprise's activity by the investor in a company that is "foreign" to him" Direct investment in principle may be carried out in two different ways. On the one hand it entails establishing a new company (with or without participation of another local trade partner). On the other, such investment may take place through acquisition of shares in an already existing enterprise (McCulloch 1993).

Private economic operators in transition economies did not have enough savings to purchase shares in state companies at suitable prices. The state does not have the capability to achieve maximization of profit having only domestic investors at its disposal. This is why, from the financial point of view, it seems advantageous to expand the investment circle to include foreign investors (or possibly to carry out privatization only with the aid of foreign investors). Moreover, rapid inclusion of foreign, international in particular, enterprises to the national economy evens out the deficiency in competitiveness between domestic operators (for more about competitiveness see: Zeibote et al. 2019).

Parent companies do not have merchandise that would be competitive on international markets – the reason lies in the lack of know-how, outdated technology or inadequate product quality. Enterprises with foreign participation usually feature a high share of equity, use modern technology and pay above-average remunerations. Based on investment data of foreign companies, it can be concluded that they carry out restructuring more quickly and more intensively than comparable companies with purely domestic participation. This indeed can lead to short-term high unemployment rates. Nevertheless, in a long run, thanks to later investment the development of a company that has been taken over will be more balanced.

As many literature sources show (look it up in references – for example the case of Slovakia), foreign direct investment plays crucial role in given country (Táncošová, 2019; Fabuš et al. 2018). Foreign investors do not only provide production capital in privatized companies, but most of all technical know-how and the know-how on the performed economic activity. They send their specialists who should introduce international standards in daughter companies smoothly and eliminate the previous insufficient level of performance. Due to specific "spreading" of imported know-how the effect of boosted performance also affects domestic enterprises which have not been privatized yet (Dieckheuer 1990).

Since the beginning of the transformation, the Polish government has been aware of the importance of foreign investors in the process of "renewing" the economy. Despite the initial resistance among the population, it was

noted that bringing in share capital and professional knowledge by foreign investors would serve the modernization of the production and services sector. Foreign models of involvement as companies took different forms. The more production capital and know-how is provided to transition economies, the more foreign companies can enjoy the advantages of a given country such as a low level of wages or good education of the workforce (Wilhelm 1996).

Despite above mentioned advantages of privatization, it can also bring some shortcomings in the long run. In accordance with that opponents of privatisation have condemned it as "selling the family silver to pay the bills". In their opinion, the government, and thus society at large, loses from privatisation, because it gives up a positive stream of cash flows (potential dividends) and puts it in the hands of private buyers (Marques-dos-Santos 2007). Against this background problem of another nature arises. In case of public water companies or rail companies after privatization, private monopoly is created. Therefore there is still need for government regulation, similar to under state ownership (to prevent abuse of monopoly power). Furthermore, privatised businesses are more likely to focus on profit (for more see: Kunitsyna et al. 2018.). This can be bad if the profit-maximising activities of the private business hurt society. If natural monopoly public enterprises are privatized and unregulated in an environment in which property rights are not secure, management is very likely to take an extremely short run view of profit maximization (for more see: Bradburd 1992). The "take the money and run" policies implied by this will yield all the undesirable deadweight loss and distributional consequences of private monopoly and none of the efficiency and service improvement benefits. Private sector managers may have no compunction about adopting profit-making strategies or corporate practices that make essential services unaffordable or unavailable to large segments of the population (Goodman 1991). A profit-seeking operation may not, for example, choose to provide health care to the indigent or extend education to poor or learning-disabled children (Pettinger 2017).

What is also crucial privatization increases income inequality through the decline of contracted workers' wages and benefits. When governments directly provide a service, they often provide living wages and decent benefits to workers. When private companies take control, they often slash wages and benefits in an attempt to cut labor costs, replacing stable, middle class jobs with poverty-level jobs. Reduced worker wages and benefits not only hurt individual workers and their families, but also local economies and the stability of middle and working class communities (Cohen 2016).

Nevertheless, in this paper the author will demonstrate the positive side of privatization and namely the impact of a foreign investor on the development of Bank Przemysłowo-Handlowy in Cracow. A literature review will be used for this purpose, i.e. transaction documentation and post-audit statements of the Supreme Audit Office and delegations of the Ministry of State Treasury. The picture of how Hypovereinsbank has influenced the operation of BPH after the acquisition of shares will be presented as an outcome of this review. It is, thereby, a good example of denying the popular opinion about exploitation of local employees by foreign companies. Furthermore, novelty of my research consists in detailed description of ownership changes in banking with regard to its impact on the both certain company as well as thereby the development of capital market in Poland (for more information about privatization strategies in Poland see: Massmann 2002).

2. Agreement between the State Treasury of the Republic of Poland and Bayerische Hypo- und Vereinsbank AG - sale of shares of Bank Przemysłowo-Handlowy

In January 1995, an agreement between the State Treasury of the Republic of Poland and Bayerische Hypo- und Vereinsbank AG was executed for the sale of shares of Bank Przemysłowo-Handlowy and, thus, Bank Przemysłowo-Handlowy in Cracow was privatized. It was decided in the agreement that HVB's performance

thereof will involve carrying out investment obligations and fulfilling obligations concerning employee matters and other obligations resulting from the agreement (Supreme Audit Office, 2006).

Bayerische Hypo- und Vereinsbank Aktiengesellschaft, headquartered in Munich (now UniCredit Bank AG) is a universal bank. With its subsidiaries it is one of the leading providers of banking and financial services in Germany. It offers a comprehensive range of banking and financial products and services to retail, corporate and public-sector customers, international companies and institutional customers. HVB Group has a well-developed network of branches in Germany, which was modified to accommodate changing patterns of customer behaviour in recent years. In total, HVB Group has 503 offices around the world – 348 of which are HVB offices in Germany.

Bank BPH, in turn, is a Polish universal bank. Until 2008, it was majority owned by UniCredit. In 2008, GE Money Bank took over 89% of shares and on 31 December 2009, Bank BPH merged with GE Money Bank Polska. At its peak, the bank employed over 10,000 people. In October 2014, the bank's owner, General Electric, revealed it was considering selling the firm. In late 2016, Bank BPH was purchased by Alior Bank. Operations of the two banks merged in early 2017 (Hypovereinsbank 2018).

It terms of the development of the distribution network, Hypovereinsbank supported the strategy of continuing existing main directions of development of BPH's distribution networks. It involved the establishment of small branches. They were located in areas with a high concentration of medium- and high-income customers. Great emphasis was also placed on the development of new, electronic distribution channels (on the basis of the Profile system). The said activity of the strategic investor was reflected in numbers. Thanks to the activity of Hypovereinsbank:
  - the number of BPH branches doubled before 2001 to reach the target situation of 400 bank branches,
  - cash machines were installed at a pace corresponding to the number of newly-opened branches,
  - bank branches in all new voivodship cities were launched,
  - the concept of a multi-option bank was implemented.

All of the above facts resulted in BPH becoming a stronger bank in a financial and market angle (i.a. a retail network).

Hypovereinsbank also initiated the Bank's Development Programme. It included a development programme of individual market segments. As a part of it, thanks to the strategic investor:
  - banking services for enterprises were improved (customers of Vereinsbank Polska and Hypo-Bank Polska were transferred to BPH; new customers were acquired, including enterprises with foreign capital participation; this was done through the network of BPH branches with the support of Hypovereinsbank);
  - an intensive training programme for BPH personnel was implemented;
  - leaders of a local character were acquired, mainly in the area of small and medium-sized business;
  - existing and new banking products were developed (in particular: financing foreign trade, electronic banking, cash management, leasing);
  - retail banking was developed (the standard of customer service was improved); further segmentation of customers was carried out by focusing on 3 groups of customers of the retail market:
  a. highest earning customers (private banking),
  b. medium- and higher-earning customers (making a living mainly by working for the bank's corporate customers),
  c. youngest customers (who are the fundament for creating a future base of high-earning customers)

Moreover, the strategic investor Hypovereinsbank contributed to:

- the development of BPH's alternative distribution channels (e.g. telephone banking or Internet services); this was done mainly through offering mortgage banking services and distribution of life insurance policies and granting consumer credit,

- the development of the product portfolio.

Furthermore, Hypovereinsbank provided BPH with experience in terms of:

- methods for selling and providing services, marketing and performance management,

- investment banking - Hypovereinsbank provided support to BPH in the development of the following planes of investment banking:

a) capital market operations i.e. services-related organization of issuing debt instruments (bonds) and shares,

b) trading of securities on the secondary market,

c) corporate finance, i.e. consulting at mergers and acquisitions, privatizations and general consultancy for selected customers;

- developing a full package of products related to asset management (including analytical and advisory activity);

- mortgage banking (a mortgage bank was created on the basis of Hypo-Bank Polska, subsidiary to BPH); it became a development platform for BPH's mortgage activity; the strategic investor developed the following in BPH in this period:

a) a full range of mortgage banking products for corporate and retail customers;

b) distribution channels for mortgage banking products on the basis of BPH's branch network;

c) activity in the field of covered bonds (they were a basic instrument of refinancing the mortgage portfolio);

d) IT systems (they supported the distribution of mortgage banking products and management of the mortgage portfolio).

Moreover, in terms of development and human resources management Hypovereinsbank aided the development of the remuneration system in BPH. This system encouraged employees to work effectively, it increased employee loyalty and created an opportunity of real enhancement of individual earnings (for more see: Androniceanu et al. 2017). The strategic investor also supported the introduction of an intensive training programme. It included general and specialist training for BPH's employees and management carried out in Poland and in renowned international training centres. As a result, thanks to Hypovereinsbank BPH's employees were given the opportunity to participate in various thematic courses (including risk management, mortgage banking, investment banking and treasury activities).

3. New technological systems in the bank

After BPH had acquired a strategic investor, consistent implementation of the agreed directions of development was launched in the bank. Consequently, Hypovereinsbank initiated breakthrough undertakings. They significantly contributed to a successive transformation of BPH into a modern financial institution. Owing to this it was able to face the challenges resulting from the ever more competitive market. The following must be included among the said breakthrough undertakings:

- ensuring the opportunity to use PROFILE, a centralized IT system (it was implemented in the central office and throughout the distribution network; at the end of 1998 the system was rolled out in approximately 20% of bank branches and the finalization of the implementation took place in 1999);

- in terms of IT systems, BPH purchased additional licences; they authorized the use of PROFILE, an integrated banking transactional system; this took place in connection with the development of the network of bank branches and the e-MCI interface; the e-MCI interface served to integrate the Cortex system with the

PROFILE system in an on-line mode be means of Middleware, a banking system – the strategic investor allocated PLN 1,854,562 for this purpose;

- the strategic investor made capital investment for the development of Cortex; this system served to manage the network of cash machines and to authorize transactions (made by cards issued by the bank); Informix database programmes were purchased for the Cortex system; the strategic investor spent PLN 7,206,739.57 on Cortex;

- the strategic investor undertook capital expenditure for the development of online banking systems; they made it possible to submit instructions which concerned customers' orders in an electronic form; they also allowed for the introduction and development of online banking; electronic and online banking systems made it possible to launch a new additional distribution channel and to expand the array of offered services; Informix database programmes were purchased for the electronic and online banking systems; the strategic investor spent PLN 6,949,339.60 in total on electronic banking systems;

- the strategic investor created a data warehouse, i.e. the Information System for the Management (MIS-1); it included reporting sheets obligatory for NBP and sets of basic economic indicators; Oracle's database programme was purchased for the Information System for the Management; the investor also made capital investment for the BPH Brokerage House in terms of programmes and licenses; funds were allocated for developing the following programmes: Makler, POK-Makler, Sponsor, Vivaldi; moreover, Hypovereinsbank purchased a license for a brokerage application PROMAK and rolled it out – in order to boost the efficiency and enhance the quality of customer service; the new brokerage application made it possible to adapt the BPH Brokerage House system to cooperation with a new stock exchange system (SES) introduced by the Warsaw Stock Exchange; the investor purchased an online customer service system of the vIBank Norkerage House and a database programme Informix for the PROMAK application; the costs incurred by the strategic investor for programmes and licences for the BPH Brokerage House amounted to PLN 2,701,428.69;

- as regards Kondor +, Hypovereinsbank purchased rights to use this system; it also undertook capital expenditure for the implementation and development thereof – the system served to register, monitor and manage risk and to control counterparty risk broken down into individual products; the strategic investor purchased Sybase, a database system, for Kondor +; PLN 5,845,466.86 in total was spent on the Kondor + system;

- in the matter of the Middleware system, Hypovereinsbank purchased utility software for BPH; this enabled the creation of a system which integrated external IT systems with a transaction system; the strategic investor spent PLN 5,085,468.99 in total on the Middleware system;

- Hypovereinsbank purchased and rolled out the Imex system; it served to support the processing of documentary operations (documentary collection, letter of credit); the strategic investor spent PLN 520,432.13 in total on the Imex;

- Hypovereinsbank purchased a licence for and rolled out application software ELBA 24; this provided communication between the server operating bank balance printers and the transaction system; the strategic investor purchased ProTopas and ProView system software; it was indispensable in building the functionality of the self-service transaction terminal; it was to allow the performance of financial services; the strategic investor spent PLN 1,057,815.10 in total on the ELBA 24 application software;

- Hypovereinsbank purchased the MySAP.com system for human resources management in BPH; the strategic investor spent PLN 840,723.45 in total on the MySAP.com system;

- when it comes to reporting systems, Hypovereinsbank purchased and made capital investment for the development of computer (system and application) software for handling reporting to NBP and other reporting (including reporting to the strategic investor); the strategic investor spent PLN 3,054,749.50 in total on reporting systems;

- as regards other systems, Hypovereinsbank purchased other computer programmes for BPH's internal needs (application and database software); the strategic investor spent PLN 3,240,002.41 in total on other systems;

- in terms of back-up system centres, Hypovereinsbank undertook capital expenditure for building back-up centres for BPH's computer systems; these centres operated under the control of the LN and Unix operating

systems and for the Profile System, and also for the system of creating back-up copies; the strategic investor spent PLN 8,370,093.41 in total on back-up system centres;

- in the matter of computer systems of BPH's head office, Hypovereinsbank made investments in expanding servers which worked for the LN and Unix systems; moreover, it introduced and rolled out the Windows IT application in central management of work stations in BPH S.A.'s branches as well as Help-Desk management systems and a central archiving system; the strategic investor spent PLN 22,613,287.87 in total on the head office's computer systems;

- Hypovereinsbank purchased licences for servers and work stations as well as office suites, system and utility software; the strategic investor spent PLN 23,776,642.58 in total on the licences;

- Hypovereinsbank undertook capital expenditure concerning a technological merger; it was associated with a key stage of integration of BPH S.A. with PBK S.A.; it involved combining IT systems of both banks; as a result, the integration of the IT systems allowed customers to use a comprehensive product offer in any of the 500 or more bank branches; the technological merger expenditure amounted to PLN 479,812.34

- the remaining investment expenditure was undertaken by the strategic investor for a central printing office; due to the roll out of the centralized PROFILE system it became necessary to ensure the technical infrastructure to service the entire bank network (printing bank statements) - the strategic investor allocated PLN 7,259,354.98 for this purpose.

- Hypovereinsbank, the strategic investor, allotted further investment expenditure for the "Cherry Business Park"; the investment involved the preparation of rooms for the bank's head office units located in Warsaw; it was connected with the introduction of organizational changes in BPH – PLN 1,724,159.88 was set aside for this project.

- Hypovereinsbank also made capital investment associated with ensuring adequate technical infrastructure; the new infrastructure became an element of restructuring the back-office centre and the server room – the strategic investor allocated PLN 12,356,600.47 for this project.

- Hypovereinsbank undertook investment expenditure for regional cash centres; the investments made were a consequence of outsourcing cash settlement to the company Międzybankowe Centrum Gotówki Sp. z o.o.; it entailed the development of an adequate technical infrastructure – the strategic investor allotted PLN 6,325,701.51 for this project.

4. New banking systems in the company

Moreover, the strategic investor's significant contribution to the development of BPH is evidenced by the following facts:

- the implementation by Hypovereinsbank in BPH in 1999-2000 of online banking for retail customers and customers from the group of small enterprises;

- adoption by BPH S.A.'s Supervisory Board of the "BPH S.A.'s development strategy for 2000-2004"; it outlined direction of development on individual market segments – retail banking, corporate banking, international markets and mortgage banking; together with the adoption of the new strategy, the strategic investor changed management structures of the bank's head office; it introduced an organization system within it oriented towards individual market segments; moreover, Hypovereinsbank implemented a new information system for the management (MIS-1), a new system of controlling and principles of budgeting and managing financial risk;

- Hypovereinsbank rolled out a Call Center project in BPH; to this end, it established a specialised limited liability company Centrum Bankowości Bezpośredniej; beginning in June 2001 it started offering telephone services integrated with a bank account; the strategic investor launched the sale of bank products and services through a specialised telephone centre (Call Center) - the strategic investor budgeted PLN 13,486,720.79 for this purpose;

- Hypovereinsbank invested in the development of technical infrastructure (as a consequence of the development of distribution channels); it expanded the technical facilities of the bank's head office, server room

in particular; it expanded (central and branch) servers of the Central System and the Symetrix matrix for the Central System and purchased a tape library for its back-up - the strategic investor allotted PLN 26,604,933.23 for this purpose;

- Hypovereinsbank expanded the WAN and LAN ICT networks; it developed ICT systems and security of data sent through the network – the strategic investor allocated PLN 8,948,690.00 for this purpose;

- the development of a new type of bank branches, opened on attractive local markets (2001-2002) – as part of the approved development strategy for BPH S.A.'s branches Hypovereinsbank created 71 new ones; they were opened on the most attractive local markets, mainly in the south of the country and on the territory of the Warsaw conglomeration; in 5 cases the investor adapted the facilities infrastructure to the existing organizational structure; it opened 27 corporate offices (corporate centres); what is more, it created corporate banking macro-regions and retail banking macro-regions – they were the bank's organizational units superior to branches; Hypovereinsbank built and modernized structural cabling in branches; it also undertook expenditure for the ICT system, network devices, computer and ICT equipment;

- Hypovereinsbank installed self-service devices (cash machines and bank balance printers); it also created self-service areas in all newly opened banking centres; the objective of this process was to streamline customer service and to lower costs (for more about cost efficiency in banking system see: Tvaronavičienė et al. 2018); the strategic investor allocated PLN 22,690,444.08 for this purpose;

- Hypovereinsbank restructured the back office; it outsourced cash settlement to a separate company Międzynarodowe Centrum Gotówki Sp. z o.o.; it also recapitalized BPH's subsidiaries; they provided specialized financial services e.g. in terms of mortgage banking and leasing (2001).

In the matter of marketing and training of BPH personnel the following actions were undertaken by the strategic investor:

- the project of regionalization of BPH S.A.'s branches – 4 sales management regions were created; decentralization of decisions took place owing to this and conditions for flexible management of the network of branches were created;

- the concept of organization of specialist teams for individual customer service in branches - 3 teams were appointed in the structure of branches, specializing in mass, medium-affluent, affluent and small business customer service;

- the Consumer Finance project and the BIKE project – concerned BPH S.A.'s cooperation with Norisbank in terms of the sale of credit and retail loans;

- Hypovereinsbank's cooperation with BPH in organizing a contest for customer advisors; it involved the sale of Sez@m internet accounts along with organizing prizes for the winners (a trip to Germany);

- the customer segmentation project – held with constant participation of Hypovereinsbank AG's representative in the working party; an ABS-type segmentation project was being prepared within each customer group;

- marketing plan – Hypovereinsbank AG worked together with BPH in the matter of planning, organizing and outlining the schedule of advertising campaigns; moreover, both entities defined shared product priorities, target markets and the form of internal communication (including a retail service); in accordance with the new concept six promotional campaigns were organized;

- the concept of direction of the development of the retail product price policy - Hypovereinsbank outlined the direction for the development of this policy through: discussing the issues of assignment of price competence, basing the interest rate for retail customers on the market rate, introducing periodically adjusted interest rates for retail customers and the fees and commissions tariff;

- Insurance Cooperation Project – Hypovereinsbank introduced the sale of insurance in the BPH S.A. network and included insurance in bank products;

- small-enterprises project – Hypovereinsbank adopted a strategy for the small-enterprises segment; it focused its action on managing sales and continuation of training programmes for advisors as well as further development of electronic banking;

- Hypovereinsbank organized seminars for directors of branches in Zakopane, Szczyrk and Rytro;

Hypovereinsbank's transfer of banking technology was also significant in this aspect. It entailed working within the framework of the Integration Project. Thus, the strategic investor performed a transfer of know-how to BPH as regards:

- managing credit risk of corporate and retail banking;
- management in terms of investment banking, property financing;
- financial management;
- banking and IT technology;
- bank processes (Report, 2002).

Conclusions

Thanks to the literature review of BPH's transaction and post-transaction documentation (post-audit reports of the Supreme Audit Office) the author came to a few interesting conclusions. After purchasing shares of the aforementioned bank, Hypovereinsbank fulfilled investment obligations laid down in the purchase agreement. It did so by bringing in know-how in the form of organized training programmes, technologies, organizational methods, etc. Therefore, the foreign investor's direct contribution to the qualitative development of BPH was presented (this contribution was demonstrated in the study by cash sums spent by the investor on individual areas of operation, created branches, introduced computer programmes, etc). Summing up, the literature review of the documentation related to the share purchase transaction demonstrated a positive influence of a foreign investor in a Polish bank and thus was an example of the denial, mentioned in the beginning, of a common opinion of exploitation of local employees by foreign companies.

References:

Androniceanu A., Krajčík, V. 2017. Integrated performance management system in a globalized organization. Conference: Finance and performance of firms in science, education and practice, 26-27 April, 2017, Zlin, Czech Republic, Proceedings of the 8th International Scientific Conference Finance and Performance of Firms in Science, pp. 30-43. ISBN 978-80-7454-653-2.

Bradburd, R. 1992. Privatization of Natural Monopoly Public Enterprises: The Regulation Issue. New York: Published by Review of Industrial Organization, p. 38. https://doi.org/10.1007/BF01027074

Cohen, D. 2016. How privatization increases inequality. Oakland: Published by In the Public Interest, p. 4.

Dieckheuer, G. 1990. Die Bedeutung ausländischer Direktinvestitionen fűr Beschäftigung, Struktur, Wettbewerbsfähigkeit und Wachstum von Volkswirtschaften – dargestellt am Beispiel der Bundesrepublik Deutschland 1950-1990. Volkswirtschaftliche Diskussionsbeiträge, no. 131. (The importance of foreign direct investment for employment, structure, competitiveness and growth of economies - illustrated by the example of the Federal Republic of Germany 1950-1990. Economic Discussion Contributions, no. 131.) Münster: Published by Westfälische Wilhelms-Universität Münster, p. 19.

Fabuš, M.; Csabay, M. 2018. State aid and investment: case of Slovakia. Entrepreneurship and Sustainability Issues 6(2): 480-488. http://doi.org/10.9770/jesi.2018.6.2(1)

Globan, T. 2018. From Capital Surges to Capital Drought in A Small Integrated Economy - Lessons from Croatia. Transformations in Business & Economics 17(1 (43)): 192 -215

Kunitsyna, N., Britchenko, I., Kunitsyn, I. 2018. Reputational risks, value of losses and financial sustainability of commercial banks. Entrepreneurship and Sustainability Issues 5(4): 943-955. http://doi.org/10.9770/jesi.2018.5.4(17)

Goodman, J. B., Loveman, G. W. 1991. Does Privatization Serve the Public Interest? Harvard Business Review, November – December 1991. https://hbr.org/1991/11/does-privatization-serve-the-public-interest

Hypovereinsbank AG, Annual Report 2018

Karaszewski, W. 2004. Bezpośrednie inwestycje zagraniczne. Polska na tle świata. (Foreign Direct Investment. Poland against the background of the world) Toruń: Published by Dom Organizatora, p. 19.

Lederer, V. 1998. Zur Transformation mittel- und osteuropäischer Betriebe: ein Vergleich ostdeutscher, polnischer und bulgarischer Betriebe auf qualitativ-empirischer Grundlage (On the transformation of Central and Eastern European enterprises: a comparison of East German, Polish and Bulgarian companies on a qualitative-empirical basis). München und Mering: Published by Rainer Hampp Verlag, p. 57.

Marques-dos-Santos, Jose E. 2007. The Long-Run Fiscal Impact of Privatisation: An empirical assessment of the Brazilian experience. p. 2. https://pdfs.semanticscholar.org/6d6c/02656e443ececc6d2917a86dc358001d5db3.pdf

Massmann, E. 2002. Alternative Privatisierungsstrategien in MOE-Staaten: eine Analyse unterschiedlicher Verfahren im Hinblick auf ihre Anwendung am Beispiel der Republik Polen (Alternative privatization strategies in CEE countries: an analysis of different procedures with regard to their application using the example of the Republic of Poland). Köln: Published by Josef Eul Verlag.

McCulloch, R. 1993. New Perspectives on Foreign Direct Investment, in Froot K.A., Foreign Direct Investment, Chicago: Published by University of Chicago Press, p. 43-45.

OECD Benchmark Definition of Foreign Direct Investment, Fourth Edition 2008, p. 48.

Pettinger, T. 2017. Advantages and problems of privatisation. https://www.economicshelp.org/blog/501/economics/advantages-of-privatisation/

Protocol from an audit carried out by the Supreme Audit Office in the Delegation of the Minister of the State Treasury in Cracow in the period between June and September 2005 on the strategic investor Bayerische Hypo- und Vereinsbank AG's fulfilment of non-price obligations laid down in an agreement executed on 22 October 1998, April 2006, p. 2.

Przybylska, K. 2001. Zagraniczne inwestycje bezpośrednie jako podstawowa forma ekspansji gospodarczej transnarodowych korporacji (Foreign direct investment as the basic form of economic expansion of transnational corporations). Kraków: Published by Zeszyty Naukowe Akademii Ekonomicznej w Krakowie, no. 585, p. 12.

Report on the fulfilment of investment obligations laid down in article 4 of the agreement for the purchase of 4,316,670 shares of Bank Przemysłowo-Handlowy Spółka Akcyjna, Warszawa, 2002, pp. 2-3, 9.

Táncošová, J. 2019. The role of foreign direct investment in the economy of Slovakia, Entrepreneurship and Sustainability Issues 6(4): 2127-2135. http://doi.org/10.9770/jesi.2019.6.4(40)

Tvaronavičienė, M., Masood, O., Javaria, K. 2018. Preconditions of the eurozone economic security: how to overcome liquidity risk and cost inefficiency in leading banks of UK and Germany. Polish Journal of Management Studies 18(1): p. 418-427. http://doi.org/10.17512/pjms.2018.18.1.31

Wilhelm, M. 1996. Gründe für Direktinvestitionen (Reasons for direct investment), in: Ifo Schnelldienst 7 – 8/1996, p. 29.

Zeibote, Z., Volkova, T., Todorov, K. 2019. The impact of globalization on regional development and competitiveness: cases of selected regions. Insights into Regional Development 1(1): 33-47. https://doi.org/10.9770/ird.2019.1.1(3)

Waldemar MILEWICZ is assistant professor at Warsaw School of Economics (Department of Research on the German Economy). He gives lectures and exercises in the following subjects: "International economic relations", "Microeconomics", "Internationalization of the firm". Research interests: capital markets, finance.

ORCID ID: orcid.org/0000-0002-8652-6307

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

TOWARDS DEVELOPMENT OF TOURISM INDUSTRY: INSIGHTS INTO TOURIST NUTRITION VIA FOOD AND IMPRESSIONS

Elena V. Frolova [1], Olga V. Rogach [2], Tatyana M. Ryabova [3*]

[1,2,3] *Russian State Social University, 4 p. 1 Wilhelm PIK str., Moscow, 129226 Moscow, Russian Federation*

E-mail: 3* tani-87@inbox.ru (corresponding author)

Abstract. The article presents conclusions about the impact of food on the development of the tourism industry. It is established that gastronomy contributes to the attractiveness of local tourist products and services, increasing tourist flows. The leading method of research has become a deep relation interview with a tourist, who was attending cafes and restaurants during the journey. The results of the study illustrate the factors of choice of food outlets for social groups with different income levels; the impact of new trends in tourist food on the development of the restaurant business, which is especially important for determining the prospects for the development of the tourism industry. The authors developed a hierarchy of triggers for the formation of tourists ' impressions of food consumption in the trip: basic needs and attitudes to consumption, hospitality and interdependent relationships, impressions and emotions. Consideration of tourist food as a synthesis of food and experiences provides an increase in the competitive potential of the territory, the diversification of the local economy, the profits growth of the tourism industry. The formation of tourist satisfaction from food consumption creates the basis for re-visiting the territories, the spread of positive responses. It is established that the impression of a tourist trip may depend on the organization, completeness, exclusivity and "unusual" food consumed in the journey. The results of the study showed a relationship between high ratings of exclusivity of the dish/place of food and getting positive impressions from visiting the restaurant, as well as from the trip in General. Visualization of food and photo replication in social networks has a significant impact on the formation of positive impressions. Getting likes and approval of the reference social group is a mechanism that reinforces positive impressions. At the rational level, the Russian tourist is focused on obtaining quality goods and services. Whereas on the emotional level, the attitude to unforgettable emotions and impressions dominates. The emphasis on the practices of commercialized hospitality, attention to the successful communication of the restaurant staff and the tourist provides emotional involvement of the tourist in the process of food consumption, which forms a stable orientation of the tourist to re-visit.

Keywords: tourism industry; tourist market; tourist product; food; impressions; commercialized hospitality

1. Introduction

In modern conditions of globalization, increasing the mobility of tourists, his desire to obtain exclusive experience new points of growth of the tourism industry is such a factor as gastronomy (Lee et al, 2017.). Increasing competition in the market of tourist services requires the search for innovative approaches and new competitive advantages of the territories. In this context, it is gastronomy that has the potential to develop the tourism industry of both countries as a whole and individual territories. Understanding of tourist nutrition as a new factor in the development of the tourism industry is dictated by current trends in the models of tourist behavior: the need for authenticity, impressions, following fashion. Food on a tourist trip is an integral element of travel. Today, food is becoming increasingly important, affects the choice of tourist tour.

A number of studies have concluded that gastronomy is a tourist marker of the region. The value of food consumption has an impact on the tourist's perception of the attractiveness of the territory (Choe, Kim, 2018). Analysis of research on this topic has identified six factors that provide a positive assessment of tourists ' gastronomic experience: the strategy of attracting tourists, cooperation between stakeholders, the effectiveness of management, promotion of culinary profile, quality of service (Ottenbacher & Harrington, 2013; Shevyakova et al., 2019). Research is of interest that emphasize the importance of "dialogue" between tourists and restaurateurs as an important tool for the development of the tourism industry (Alonso & Liu, 2012).

In the context of relations of cooperation, a special role is assigned to local food, awareness of tourists about the features of national dishes (Rogach, et al., 2017). Kivela J. J. and Crotts J. C. conclude on the relationship between the experience of food consumption and the perception of culture, which creates a prerequisite for the re-return of the tourist (Kivela & Crotts, 2009). The consequence of this situation may be an active growth of tourist flows. The interest in traditional dishes is part of the overall desire for an authentic experience. "Culinary heritage" is a strategic resource for the development of the tourism industry. At the same time, it is important to update, adapt and reinterpret cultural heritage, which combines the desire for authenticity and innovation. (Bessiere, 1998).

Traditionally, gastronomy is considered as a factor of socialization of the individual (Brian, 2018), in the conditions of development of the tourism industry gastronomy becomes a source of formation of a new self-identification of the tourist, opening the "door" to a new cultural world (Urry, 2000).

The tourist's nutrition involves the whole complex of sensory sensations, ensuring the presence of a special relationship between the food and the impressions received. In particular, the emotions of the tourist from restaurant visits and food consumption play a special role in the formation of a sustainable intention to re-visit (Chen, Lin, 2018). Revealing the factors of formation of impressions from the consumption of food in the restaurant, Williams H. A., Yuan J. and Williams R. L. they identified the key ones: extreme conditions of eating, partnership between a tourist and a restaurateur, authenticity, sociability and emotions (Williams, Yuan, & Williams, 2018).

The basic component, which is of great importance when choosing a place of food consumption by a tourist, is safety. This characteristic is considered by researchers as a basis for assessing the quality and level of demand for restaurant/cafe services (Meltzer et al., 2017). Concerns about food safety and the risks of food poisoning are associated with an increase in the frequency of meals outside the home for residents of modern cities (Knight et al., 2009). Estimates of the level of safety of food consumption by a tourist during trips are determined by the significance of a number of parameters. These include: the territorial location of the feed point (the proximity to the beach, downtown, airport) (YongJin, 2019), the affiliation of the restaurant to known networks/brands (Leinwand, etc., 2017), the representation of the restaurant on the Internet, including the number of positive reviews on social networking sites (Tussyadiah, 2018), appearance of the meals (Bingham and Lavau, 2012).

The establishment of a "fair" price for food for the restaurant business is closely related to the price sensitivity of tourists (Raab et al., 2009). The price range is one of the key characteristics that affect the choice of a tourist food point during the trip. In particular, the cost factor affects the behavioural intentions, satisfaction of the tourist and his loyalty to a particular restaurant/cafe, the probability of a repeat visit (Lu & Chi, 2018). In addition, modern studies show that there is a close relationship between the socio-economic status of the tourist and his choice of food point category (Baumann et al., 2017). Also, the perception of price, the assessment of its fairness correlates with the estimates of the appearance of the restaurant/cafe (Han & Ryu, 2009). Room design/decor, decorations, spatial layout, where the tourist consumes food has an impact on consumer behaviour, the formation of the traveller's satisfaction from the trip (Rahman, 2009).

In addition to the physical aspects of the consumption space, the social aspects of the consumer environment (Matson-Barkat & Robert-Demontrond, 2018), the appearance of the staff, hospitality (Hanks & Line, 2018). In studies of Lo Y. T., Awang S. R. and Jusoh A. it is concluded that the quality and nature of the relationship between the guest and the host determine the emotional involvement of the tourist, the level of his loyalty (Lo et al., 2018). Quality of service according to a number of scientists is the only attribute that directly or indirectly affects the level of trust of tourists to the selected restaurant/cafe (Hyun, 2010).

Given the high importance of the basic characteristics that determine the choice of tourist food places (safety, fair prices, design, service), they can be considered as prerequisites for the formation of tourist impressions of food (Stone, 2017). New trends in gastronomy, which illustrate the transition from the consumption of food to the consumption of impressions, increase the importance of the emotional response of the tourist. In addition, the positive impressions of the tourist from the food reduce the possible dissatisfaction with other conditions of the organization of the trip.

Despite the considerable amount of publications on this subject, there is a lack of research that considers tourist food through the relationship of food and experiences. The development of the tourism industry requires a more detailed study of the gastronomic sector as a factor in attracting tourist flows, increasing the volume of the tourist market. Scientific publications do not sufficiently consider the impact of new trends in tourist nutrition on the development of the restaurant business; the relationship between the practices of gastronomic experience and the formation of new tourist products and offers. In addition, the factors of choice of food outlets for social groups with different income levels are insufficiently studied, which is especially important for determining the prospects for the development of the tourism industry.

Based on the key provisions, correlations and conclusions made by leading scientists in this field, the authors developed a schematic illustration of the hierarchy of triggers for the formation of tourists' impressions of food consumption during the journey (Fig.1).
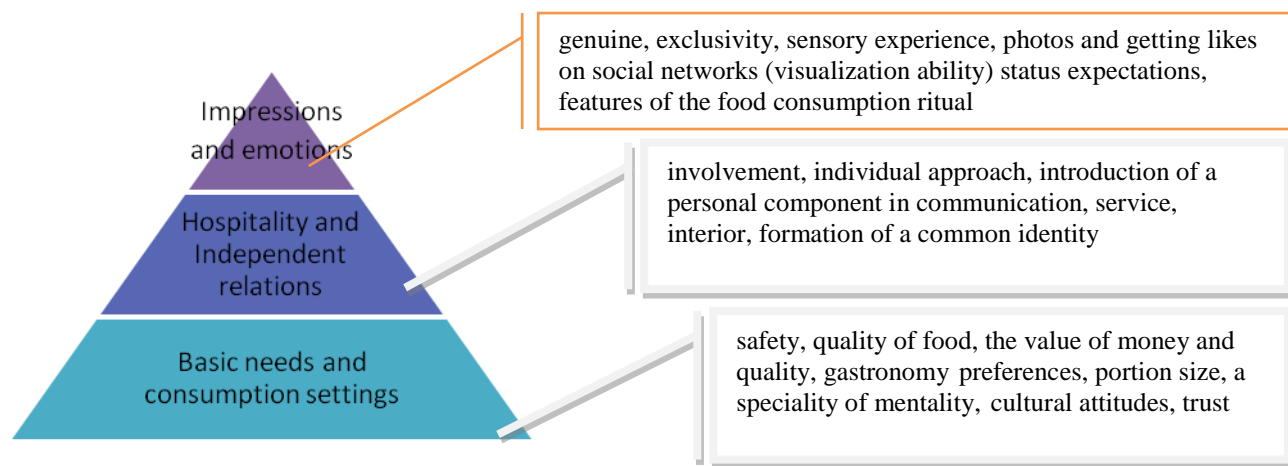
Figure 1. Pyramid of consumption: from basic values to exclusive experiences.

The formation of tourist satisfaction from food consumption creates the basis for re-visiting the territories, the spread of positive responses. These circumstances can be considered as sources of development of the tourism industry.

Analysis of scientific sources on the problem of research revealed three key blocks of formation of tourist satisfaction from food consumption. Basic needs and settings for consumption are one of the key filters for the selection of tourist places of food. Travellers, eating out of the house and the usual environment, impose increased requirements for safety, quality of food, hospitable service. The relationship that develops in the process of consumption between the tourist and the staff affect the level of confidence in the restaurant/cafe, provide emotional involvement of the tourist in the process of consumption.

These characteristics of food tourists, according to the authors, are arranged according to the hierarchy. Their structural section is formed under the influence of the social environment, socio-economic status of the tourist, cultural experience, latent or direct expectations, fashion, visualization of gastronomic experience of other tourists. The modern tourist places special requirements to the process of food consumption on a tourist trip, considering food not only as a product of saturation but as an opportunity to join another culture, gain new experience, emotions and exclusive impressions from the trip.

The purpose of the study is to study new trends in the development of the tourism industry, the interpretation of tourist food through food and experiences. The article deals with the features of the tourist's food during the trip based on the analysis of key characteristics, factors of choice of food/restaurant, to determine the correlation between the parameters of the tourist's food and the impressions received.

2. Basic needs and settings for consumption

The tourist's assessment of the gastronomic segment of the trip is traditionally based on the basic human needs for safety and satisfaction of their primary needs. The concept of security is subjective, which is formed in the process of family education, cultural familiarization with the rules of eating adopted in a separate society. From this point of view, the food in the journey can be considered as a risk factor that can significantly reduce the quality of rest. The security control is carried out by tourists in several areas: compliance with sanitary-hygienic

requirements, the credibility of the quality of the products, the vernal species of the interior, the staff, the products on display. In this context, restaurants/cafes of well-known brands /or international chains are in a more advantageous position, having a high level of consumer confidence. While individual catering outlets are forced to put more effort to win the trust of customers. The tools to increase the tourist's sense of security when visiting food outlets are positive reviews in social networks, the site of the institution, the corresponding status and the target audience of the institution.

Another component of basic needs is value for money. In several studies (Ryu & Lee, 2017), the concept of a fair price is derived, which implies a direct relationship between the quality of food and its real value. A fair price characterizes the willingness of a tourist to pay a specified cost for a particular product. At the same time, the price filter is one of the factors in the formation of the social identity of the tourist on the trip.

The orientation of some restaurateurs to maintain the price segment by reducing the size of portions has certain risks (Felten, 2012). This strategy may conflict with the behavioural expectations of tourists, focused on satiating hunger for a price. Gastronomic preferences and portion size are determined by the peculiarities of mentality, cultural attitudes, socio-economic status of the tourist.

2.1. Hospitality and interdependent relations

Ensure the involvement of tourists in the process of eating. Commercialization of guest – host relations can be supported by an individual approach to the client, bringing a personal component in communication with tourists (Moskwa, etc., 2015). Assessing the quality of service, tourists pay special attention to friendliness, attention to their needs, adequate response to emerging problems (Rogach, etc., 2017). Another important aspect is the appearance of the restaurant. The very concept of the interior can become a driver of attraction of tourists as well as the evaluation of gastronomic content. Interesting design, unusual practice of eating allows tourists to get a new experience.

2.2. Impressions and emotions

The basis for obtaining impressions can be familiarized with the national culture of food consumption (Ko, 2018). Recreation of gastronomic knowledge, exploitation of interests of tourists to traditional dishes of authentic cuisine are considered today by restaurateurs as one of the mechanisms of formation of impressions of the tourist. However, this practice is ambivalent. In particular, the presence of a single goal (attraction of tourists) can lead to a potential loss of authenticity of consumption culture, imitation of rituals, historical and national component of gastronomy (Rezaei, Naimeh, 2017).

Another factor in attracting tourists is an innovative approach to the formation of his exclusive experiences by connecting the sensory experience of food consumption. Sensory experience and nutrition are closely linked, forming a model of consumption of tourists. Emotions play a mediating role in the relationship between sensory experience and behavioural intentions (Chen & Lin, 2018).

The satisfaction of a tourist's need for consumption of gastronomic novelties can be considered as recognition of his high socioeconomic status or personal characteristics of a modern person who follows new trends (Jin et al., 2015). Food can be considered as a subject of imitation, when a tourist consciously supports a constructed "performance" aimed to "impress the audience", to acquire the social status that he would like to broadcast for his environment. The possibility of visualization of the impressions leads to the simulation of replicated images that shape other social actors latent or explicit desire for the consumption of the same experiences. "A traveller" looks at the world through the camera lens, photos in social networks and Instagram, which creates the need for consumption of dishes with a high degree of visual appeal. More and more successful restaurateurs focus on the design of the dish, its appearance and features of the ritual of eating.

Paying special attention to the features of the ritual of eating, it is worth noting the importance of scenery, artefacts (Han & Ryu, 2009), the restaurant's embeddedness in the urban and natural landscape, its positioning as an object of tourist attraction (Josiam et al., 2004). The purposeful activity of restaurateurs in the design space of food intake provides the basis for the formation of exclusive experiences, an introduction to the history and traditions of the people. The authenticity of the experience experienced by the tourist from food consumption is based on such elements as: national cuisine, local food, historical decor, ritual meal (Rahman, 2009).

Another behavioural model of the tourist-focused on the search for impressions is the desire for innovation, a new gastronomic experience, regardless of personal food preferences. Meeting the needs of tourists in new products can become a driver of tourism industry (Jin et al., 2015).

3. Material and method

As a leading method of research used in-depth interviews of tourists visiting cafes and restaurants during their travels. Interviewing of tourists was carried out in travel agencies of the city of Moscow. The number of respondents included tourists waiting for their turn to design a tourist tour. The principle of selection of respondents was the presence of travel experience, where food was not included in the cost of a tourist tour. Tourists choosing all-inclusive tours were not invited to the study. To maintain interest in interviewing, potential participants were provided with coupons participating in discount programs of the well-known network of coffee shops in Moscow. A total of 253 in-depth interviews were conducted. The process of refinement of the obtained data allowed to exclude from the study 34 questionnaires, the answers to which raised doubts about the reliability of the data.

Participants were asked to share their demographic data. The gender ratio was 39.1% for men and 60.9% for women. The study showed that the majority of respondents showed the following level of average annual family income: (A) from US $20,000 to $30,000 (50%); (C) from $30,001 to $40,000 (33%); (C) from $40,001 to $50,000 (12%); (D) more than $50,001 (5%). The average annual income in Russia per 1 persona of December 2018 was $8008, Moscow residents have a higher relative income level - $14850.
The frequency of foreign tourist trips among the respondents was: once a year – 52.2%; 2-3 times a year – 36.4%; 4 or more times a year – 11.4%.

Besides, the majority of respondents had a high educational level: bachelor's degree (29.8%), specialist's degree (55.7%), master's degree (11.3%), candidate of science/doctor of science degree (3.2%). The presented distribution corresponds to the levels of education established in the Russian Federation, where before the adoption of the Bologna Convention, the system of higher education trained specialists (5 years of study), and post-graduate education included the defence of dissertations of candidate of Sciences, and more importantly, doctors of Sciences. The transition to the new system of training predetermined the division of the speciality into bachelor's (4 years) and master's (2 years), without affecting post-graduate education.

Age distribution of survey participants represented the following proportions: (A) from 25 to 35 years (34%), (b) from 36 to 45 years (35%), (C) from 46 to 55 years (23%) and (D) older than 55 years (8%).

4. Operationalization of constructs

We developed the questionnaire based on Keller's theory, which described the generation of tourist impressions based on the brand, not the product (Keller, 2012). This made it possible to include in the evaluation scale the exclusivity of visits to certain food items and the consumption of food, creating the impression of belonging to a certain class, obtaining a higher status and approval of the reference group. Also, Keller's theory made it possible to identify as a separate parameter for assessing the emotional involvement of tourists in the process of eating.

The authors of this concept are interpreted more broadly, which allows us to interpret emotional involvement as the acquisition of the status of a tourist participant in the action of cooking, counselling, expands the boundaries of choice and provides an increase in the level of confidence in the restaurant.

Ideas of Harrington R. J., Ottenbacher M. C., A. Staggs, Powell F. A. (Harrington et al., 2011) are taken among the methodological foundations laid in the basis of our study. The works of this group of scientists reveal the attributes-drivers of positive experience of food consumption for tourists of generation Y: quality of food/drinks, quality of service, friendliness of staff, the atmosphere of the restaurant and the speed of service. At the same time, these attributes should be expanded by taking into account such aspects of consumption as the visual appeal of the restaurant/food, the ability to broadcast new experiences in the network space, the presence of "photographed places/dishes" — exotic, unique and unique objects of consumption of the tourist, causing him a special psycho-emotional state, aesthetic satisfaction from food. The need to take into account these characteristics is supported by studies conducted by Pelegrín-Borondo J., Arias -Oliva M., Olarte-Pascual C. (Pelegrín-Borondo et al., 2016). The results obtained by scientists show that the stronger the emotions of customers, the higher the satisfaction of tourists with quality, price and service.

Besides, the findings of Ryu K. and Lee J. S. formed the basis for the development of the evaluation scale. They allowed us to highlight the restaurant's performance: interior, fair price and quality of products (Ryu & Lee, 2017). We have expanded this list with questions about the evaluation of the diversity of the restaurant's product range, the level of its exclusivity, originality and taking into account national specifics. The regional specificity of consumption culture (availability of local food and beverages) forms the reinforcement of the relationship between food and desired experiences (Alonso & Liu, 2012).

Four students enrolled in the master's program "Management", conducted a preliminary interview with 20 respondents, to pre-test and adjust the questionnaire. Respondents were asked to complete the questionnaire, based on which some language was clarified.

Each evaluation question of the first block of the questionnaire assumed the use of a 10-point scale, where 1 = is not important at all and 10 = is very important (Table 1. Distribution of average values of the characteristics of the tourist food depending on the age of the Respondent and Table 2. Distribution of average values of the characteristics of the tourist's food depending on the average annual family income).

The second block of questions of the questionnaire was made to determine the frequency of selection of certain parameters of food/food points of the tourist (Table 3. Frequency of choice according to the key characteristics of tourist food). Each evaluation question involved the use of a scale with options: never, rarely, often, always difficult to answer.

The third block of the questionnaire is related to the evaluation of the food impressions received during the last trip (Table 4. Distribution of answers to the question: "Rate the impressions received from the food in the restaurant, which you visited 2 or more times during the last trip").

5. Results

Testing for Measurement Reliability and Validity

The authors give an empirical interpretation of the hierarchy of factors forming the impressions of tourists from the consumption of food in the journey. Based on the results of the study, the authors determine the average value of the characteristics of the tourist's food, according to the previously selected blocks, which are given symbols: F1 Basic needs and attitudes to consumption; F2 Hospitality; F3 Impressions and emotions (Table 1).

Table 1. Distribution of average values of characteristics of the tourist food depending on the age of the respondent

F1 Basic needs and consumption setting security	Average				
	In total	from 25 to 35 years	from 36 to 45 years	from 46 to 55 years	Older 55 years
Security	8,1	8,4	7,6	8,2	8,7
Food grade	9,1	9,3	8,8	9,1	9,3
Value for money and quality	7,9	7,5	7,6	8,5	9
Gastronomic preferences	5,9	4,6	7,3	6,9	5,1
Portion size	4,3	6,7	2,1	2,8	8,7
Trust to the point of power	5,3	7,2	3,4	5,1	6,3
F2 Hospitality					
Involvement in the process of cooking	2,8	4,7	2,1	1,4	1,3
Individual approach	6,9	5,4	8,2	6,1	9,3
The introduction of personal component in the interaction of the tourist-restaurateur	4,1	3,2	5,5	2,8	6,1
Service maintenance	7,2	7,4	7,9	6,3	5,7
Interior	6,8	6,8	7,3	6,4	6,2
Comfort	7,4	6,5	7,7	8,2	8,1
F3 Impressions and emotions					
The authenticity of (ethnic cuisine)	6,4	4,9	7,4	7,2	6,3
Exclusivity	6,2	6,1	7,3	5,6	3,7
Sensory Experience	3,5	2,4	5,1	3,5	1,3
Photos and getting likes in social networks	5,5	7,1	6,9	2,6	1
Status expectations	5,4	4,9	6,2	5,7	3,6
Features of the eating ritual	4,7	2,6	6,5	4,9	5,2

The results of the study illustrate the following pattern. In the older age group, higher estimates of the importance of such characteristics of nutrition as "safety", "portion size", "value for money" and "individual approach" were obtained. During the in-depth interview, older respondents stressed that it is important for them to feel a special, respectful attitude. Category D respondents (over 55 years) prefer to establish personal communication with the waiter, receive personal advice about the features of the dish, the specifics of its preparation. At the same time, the presence of a language barrier can be compensated by the friendliness of the staff, its readiness for communicative interaction.

In turn, category A (25-35 years) is characterized by bipolar assessments. In this category of respondents, a large proportion of families with children. This determines the importance of characteristics such as "safety", "quality of food", "value for money". Representatives of young people who travel without children are more focused on such hedonistic and status attributes as the ability to take photos and get likes on social networks, involvement in the process of cooking, interior.

The study revealed that for all categories of respondents the most important (above or equal to 7.9 points out of 10) turned out to be such basic characteristics of food, such as: the quality of the food (9.1), security (8.1) and the ratio of price and quality (7.9). The second group by significance rating (from 6 to 7.8 points) included comfort (7.4), service (7.2), individual approach (6.9), interior (6.8), authenticity (national cuisine) (6.4) and exclusivity (6.2).

For respondents of the age category (B) from 36 to 45 years, the characteristics of nutrition such as "portion size" (2.1) and "involvement in cooking" (2.1) have the least significance. At the opposite pole (values above 7.9) there

are such characteristics as: "individual approach" (8.2) and "quality of food" (8.8). The results of the in-depth interview provide a basis for understanding this choice. In particular, the respondents of the age category (B) expressed concern about the issues of healthy nutrition, the caloric content of dishes. At the same time, the individual approach is interpreted by respondents not only in the categories of hospitality but also as special attention to food habits and preferences.

Of interest is the dependence of estimates of the importance of characteristics of nutrition and income of respondents (Table 2).

Table 2. Distribution of average values of characteristics of the tourist's food depending on the average annual family income

F1 Basic needs and consumption setting security	**Average**				
	In total (N=219)	from 20,000 $ to 30,000$	from 30,001$ to 40 000$	from 40,001 $ to 50,000$	Over 50,001$
Security	8,1	8,3	8,0	7,9	7,8
Food grade	9,1	8,7	9,4	9,9	9,8
Value for money and quality	7,9	7,5	8,4	8,2	8,6
Gastronomic preferences	5,9	5,1	5,7	8,4	9,3
Portion size	4,3	4,9	4,1	3,2	2,9
Trust to the point of power	5,3	4,8	5,9	5,8	4,4
F2 Hospitality					
Involvement in the process of cooking	2,8	2,8	3,1	2,3	2,5
Individual approach	6,9	6,6	6,7	8,6	8,1
The introduction of personal component in the interaction of the tourist-restaurateur	4,1	3,7	4,8	4,0	3,5
Service maintenance	7,2	6,8	7,0	8,7	9,2
Interior	6,8	6,2	6,5	9,1	9,6
Comfort	7,4	6,7	7,5	8,9	9,4
F3 Impressions and emotions					
The authenticity of (ethnic cuisine)	6,4	6,1	6,1	7,6	7,8
Exclusivity	6,2	5,6	5,8	8,2	9,3
Sensory Experience	3,5	2,7	3,4	5,3	7,4
Photos and getting likes in social networks	5,5	5,6	5,8	4,8	3,7
Status expectations	5,4	4,1	6,2	7,8	7,5
Features of the eating ritual	4,7	3,7	5,6	6,1	6,3

High-income category of respondents (category (D), whose income is more than $50,001) attaches the greatest importance to the following characteristics of food: "exclusivity" (9.3 out of 10), "interior" (9.6), "comfort" (9.4), "service" (9.2). At the same time, low ratings (below the average values of 1.5 times) received such characteristics as: "photos and likes in social networks" and "portion size".

In the course of the study, there was a different perception of the significance of some of the characteristics of the power for the high-and low-income categories of respondents (category (A) whose income is from 20,000$ to 30,000$). The maximum gap in the estimates of respondents is noted for the following items: "gastronomic preferences" and "sensory experience".

Average estimates are typical for low-income respondents. The most important characteristics of the power supply are concentrated in the basic unit (F1 Basic needs and settings for consumption). Respondents with a low income to a lesser extent attach importance to hospitality, impressions and emotions from the power trip.

According to the results of the study, there is no relationship between the level of income and estimates of the significance of such characteristics of nutrition as "safety" and "quality of food", which took the top positions of the rating.

The gap between the assessments of significance among high-yielding and low-yielding in many ways amounts to the following values: "exclusive" 1.7 times; "authenticity, national cuisine" in 1.3 times; "sensory experience" in 2.7 times. During the in-depth interview, it was found that the respondents of a category (A) consider food on a tourist trip as a process of satisfying hunger, do not give food on the trip an additional social and cultural burden. While the expectations of high-income tourists are much higher. In particular, the process of food consumption is not limited to the satisfaction of physiological needs and is endowed with additional psycho-emotional and socio-cultural meanings for which the tourist is willing to pay value-added.

Of interest is the respondents' assessment of such characteristics of food from the F3 block "Impressions and emotions" as "photos and likes in social networks". This is the only parameter of the block, according to which the estimates of the importance of respondents of the category (A) and (B) were higher than the estimates of respondents of other categories with higher income. This can be seen as an attempt to simulate preferred social status, material well-being and success.

Analysis of the criteria for choosing a tourist cafe/restaurant or dishes allowed us to diagnose the real situation of the ratio of the needs of travellers: "food" and "impression" (see Table 3).

Table 3. Frequency of choice according to the key characteristics of the tourist food (%)

Criterion	Never	Rarely	Often	Always	Difficult to answer
F1 Basic needs and consumption settings					
I choose a cafe/restaurant in which I am confident in the safety and quality of products	8	15	36	35	6
I choose a cafe/restaurant where the price is right for me	9	14	39	32	6
I choose a cafe/restaurant that has a special menu (children's menu with special icons)	29	26	25	14	6
I choose a cafe/restaurant because I was recommended by his friends/relatives/acquaintances	9	27	40	20	4
I choose a cafe/restaurant by reviews on the Internet	14	31	36	15	4
I choose a cafe/restaurant, focusing on well-known, recognizable brands	18	33	31	13	5
I choose the dish because it is low-calorie	30	30	22	12	6
I choose only those dishes that consist of fresh and natural products (without preservatives, mayonnaise, etc.)	18	31	29	16	6
I don't care what the main thing is to have a large portion/satisfy hunger	23	31	26	14	5
F2 Hospitality					
I choose a cafe/restaurant where I am warmly welcomed, friendly service, with special attention to my needs	7	17	39	30	7
I choose a cafe/restaurant where unobtrusive communication (table for introverts)	26	27	26	14	7
I choose a cafe/restaurant because I like the design of the interior	11	30	38	15	6
I choose a cafe/restaurant in which I do not have a language barrier (clear menu, Russian-speaking staff)	14	31	29	21	5
I choose a cafe/restaurant that is easy to reach	9	25	42	19	5
I choose one restaurant for food during the trip, so that I was attentive	29	23	20	16	12

I choose a restaurant with a special family atmosphere	19	27	42	9	3
F3 Impressions and emotions					
I choose a cafe/restaurant that has been visited by famous public figures	34	29	22	10	5
I choose a restaurant with live music.	18	32	29	14	7
I choose a restaurant with entertainment	27	31	22	14	6
I choose a restaurant with a non-standard atmosphere	25	30	24	14	7
I choose a restaurant with a bright cultural flavor (authentic dishes).	13	24	30	25	8
I choose a dish because I like its name	23	31	28	13	5
I choose a dish because I like its look in the picture in the menu/showcase	11	27	37	20	5
I choose the dish because it is unusual	35	29	18	14	4
I take pictures of my food	31	29	23	13	4
I take photos of myself in the restaurant	27	28	28	12	5
I post photos from restaurants/cafes on social networks	33	28	20	15	4
Photo with food traditionally gets a lot of likes	31	23	21	12	13
In my choice I focus on cafes/restaurants, which will be highly appreciated by my friends	21	25	30	17	7

The results of the study illustrate that when choosing a restaurant, basic needs and consumption settings (block F1) prevail, as well as in the evaluation of the significance of food characteristics (Table 1 and 2). 71% of Russian tourists choose a cafe or restaurant, focusing on a reasonable price (32% "always" and 39% "often") and safety (35% "always" and 36% "often"). Also, the recommendations of friends and relatives are a significant motivator to visit a certain food point (20% "always" and 40% "often"). More than half of the respondents when choosing a restaurant are guided by reviews on the Internet (15% "always" and 36% "often").

In the journey for the Russian tourist such characteristics of food as: "low calorie meals" (30% choose the answer "never" and 30% - "rare") and "special menu" (29% choose the answer "never" and 26% - "rare") fade into the background, not being a priority indicator of the choice of food/dish.

In block F2 "Hospitality" friendly service and special attention to the needs of tourists is an important criterion of choice. 30% of respondents chose "always" and 39% - "often". Characteristics of "room design" and "transport accessibility" of the restaurant are in the upper range of estimates of Russian tourists. In particular, 53% of respondents ("often" or "always") choose a restaurant because they like the design rooms. Almost half of the respondents consider the absence of a language barrier to be an attractive feature of the restaurant. Respondents noted the following mechanisms to overcome the language barrier: clear menu (photo dishes); multilingualism (multilingualism) staff; high communicative competence and friendliness of the host.

During the in-depth interview, respondents explained their choice using the following expressions: "it's nice to feel like a guest, not a client", "calm atmosphere", "rest", "comfort". For most respondents, the characteristic of the transfer of consumer preference from the sphere of unusual/exclusive in the direction of receiving impressions of the comfort and hospitality of the restaurateurs. Respondents were particularly encouraged to describe their eating practices in the restaurants where they personally met the host, talked to him, received additional privileges or special attention. For example, "it got cold, and the owner of the restaurant brought me a warm sweater"; "knowing that I'm from Russia, as a gift I was presented with a glass of vodka; this, of course, a stereotype, but still nice special attention"; "the owner of the restaurant recognized us and sometimes treated us free dessert". Such signs of attention form a vivid impression on the tourist, a stable orientation for a second visit.

Thus, the power of the tourist as a social phenomenon fully illustrates the specifics of the consumption of impressions. On the one hand, the impression of tourists associated with visiting unusual, exclusive restaurants, getting bright emotions from new dishes. However, on the other hand, the results of the study illustrated the increasing importance of such characteristics of food tourists as hospitality, friendliness, comfort. These components of food are sufficient grounds for a tourist to get positive impressions, forming a stable orientation for a second visit. A trip to a foreign country is burdened with stressful factors (language barrier, new conditions, difficulties of orientation, etc.), so the friendliness of the restaurateur, attention to the needs of the tourist becomes doubly valuable.

Thus, the focus on the practices of commercialized hospitality can contribute to the growth of the tourism market. In modern conditions, the development of the tourism industry is based not only on infrastructure sources, but also on such parameters of a tourist trip as: friendly attitude, new emotions, authenticity, etc.
In block F3 "Impressions and emotions" respondents ' answers are presented as follows. Characteristics of food - "unusual dishes" - was significant for 1/3 of tourists (14% are always guided by this criterion, 18% - often). A little more significant for tourists there were such characteristics as: "entertainment" and "non-standard atmosphere of the restaurant."

Today is gaining popularity "foodstagram" - photographing and posting on social networks images of food. However, the results of the survey of Russian tourists show a low commitment to this trend. Russian tourists do not seek to demonstrate various aspects of food in photo and video materials. This was noted in the responses of respondents. Every third tourist never take pictures of their food, 29% - do it rarely. Reproduction of these pictures in social networks is even more rare practice. Only 15% of respondents always post photos from restaurants/cafes in social networks, 33% - never do it. Only about one in nine respondents is always focused on these practices. 13% - always take pictures of their food, 12% - take pictures of themselves in the restaurant, the same number of respondents emphasize that the photo with the food traditionally gets a lot of likes.

Thus, the unusual dishes, entertainment programs, the ability to replicate their photos on social networks do not fully provide the formation of impressions for most tourists. Many respondents are afraid to try unusual dishes (35% of respondents do not do it ever, 29% - rarely). Please note that during the in-depth interview, respondents noted the difference between unusual dishes and national dishes. The uniqueness of the dish is interpreted by the Russians as a combination of "unacceptable" ingredients in the dish. At the same time, national dishes are highly appreciated by respondents, which is connected with the formation of special trust in local traditions, the desire to immerse themselves in another culture. While the unusual dishes associated with respondents with commercialization trends, attempts to attract the attention of imaginary exclusivity. Such practices are not credible for a significant part of Russian tourists. The exception was made by representatives of the age group from 25 to 35 years, for which tasting of unusual dishes is considered as a form of extreme tourism.

Correlation analysis of the distribution
In the course of the study, respondents assessed satisfaction with the characteristics of the dish/food point during a tourist trip on a 5-point scale. In assessing the respondents were guided by the assessment of the point of nutrition, which they would like to visit again. We analyzed the relationship between the estimates of the characteristics of food and the impressions received by tourists from visiting these food points. The most interesting results were obtained in the analysis of such characteristics as exclusivity, safety, visualization, service (Table 4).

Table 4. Distribution of answers to the question: "Estimate the impressions received from the food in the restaurant, which you visited 2 or more times during the last trip" (N=219) (%).

Characteristics of the dish/food place	Received Impressions		
	Positive	Neutral	Negative
Security			
5	32,9	42,1	25,0
4	45,9	36,5	17,6
3	43,5	36,2	20,3
2	0	0	0
1	0	0	0
Value of money and quality			
5	44,3	29,5	26,2
4	54,8	23,8	21,4
3	42,0	50,7	7,2
2	20,0	45,0	35,0
1	22,2	44,4	33,3
Hospitality			
5	46,3	38,8	14,9
4	44,4	36,5	19,0
3	46,8	36,2	17,0
2	22,7	45,5	31,8
1	15,0	40,0	45,0
Exclusivity			
5	76,2	9,5	14,3
4	37,5	55,0	7,5
3	33,3	52,6	14,0
2	25,8	9,7	64,5
1	0	33,3	66,7
visualization (photo of food, interior)			
5	71,0	27,4	1,6
4	35,3	55,9	8,8
3	35,8	26,4	37,7
2	6,3	43,8	50,0
1	0	25,0	75,0
Average	**40,6**	**38,4**	**21,0**

The relationship between safety and experience is not statistically significant. At the same time, it is natural that the respondents rated" safety" not lower than 3 points. This fact indicates that the safety of food is the basic factor of the installation for a second visit, but does not guarantee it. It was found that the absence of this factor has a significant impact on the choice of food, while its presence is perceived as a mandatory attribute and does not give "added value" in terms of the formation of impressions.

The perception of price fairness ("value for money") does not have a significant impact on the formation of impressions from visiting the food point. The results of the in-depth interview showed that for the majority of respondents on a tourist trip, the price-quality ratio is not so significant, since tourists are focused on getting acquainted with new dishes and drinks, visiting iconic restaurants, etc. For Russian tourists, the cuisine is one of the important parameters when choosing a travel destination along with weather, accommodation facilities and landscape.

The lack of hospitality significantly limits the formation of positive impressions. Among the respondents who gave low estimates for this parameter (1 point out of 5), the share of those who received negative impressions is higher than the average by 24 percentage points.

During the in-depth interview, the respondents demonstrated bipolar tendencies of perception of such parameter as "hospitality". Part of the respondents, the hospitality of the restaurateurs as molestation, simulated friendliness, way more profit. Other respondents perceive hospitality as a national tradition, an opportunity to gain new cultural experience, an integral part of the local colour. Respondents gave examples of bright gastronomic impressions, linking them not so much with the quality of food, but with hospitality (in particular, the following epithets were given: "Italian passion", "southern hospitality", "festive atmosphere", "family atmosphere", etc.).

Exclusivity and visualization, as the study showed, are the most significant drivers of the formation of positive impressions from the food point. Respondents who gave a high rating (5 points out of 5) of "food exclusivity" received positive impressions from visiting the restaurant (76.2%), which is almost 2 times higher than the average. Negative impressions are demonstrated by respondents who gave low estimates of "exclusivity" (66.7%, with average values - 21%).

The following fact is of interest. Despite the low level of importance for respondents visualization of restaurant impressions, this practice is one of the leading drivers of a positive perception of the experience of visiting food outlets. In particular, 71% of those who rated the possibility of photographing food and the interior of the restaurant the highest (5 points out of 5) received positive impressions from the food in the restaurant. This is above average by 30 percentage points. Similar results were obtained in the segment of low estimates of visualization capabilities. In particular, 75% of respondents who rated the possibility of photographing food and interior on 1 point out of 5, received negative impressions from the food in the restaurant during a tourist trip. These values are 54 percentage points above average.

6. Discussion and conclusion

Theoretical and Managerial Implications
Price equity and food safety are among the basic characteristics of nutrition. Their high score is not a guarantee of bright emotions. However, in the absence of a "fair price" for tourists, it is difficult to form a positive impression of the trip as a whole.

Search for exclusivity, authenticity, today is the central motive of the journey. In search of new experiences, modern tourist is focused on visiting important places, food outlets, marked in the guidebooks, familiarity with local food. Of great importance are the methods of the theatricalization of food consumption, creative forms of participation of tourists in the creative component of gastronomy.

Under the influence of the growing demand for different types of tourist services, their diversification is taking place. In a highly competitive environment, meeting only the basic needs of the tourist cannot guarantee the development of the tourism industry. The tourism industry faces the question of finding new points of growth of tourist attractiveness. Exclusivity, visualization, uniqueness and individual approach in the gastronomic sector can be considered as a driver for the development of the tourism industry.

In contrast to this characteristic power of the tourist as "equity prices", "exclusive" determines to get high impressions. The results of the study illustrated the relationship between high estimates of the exclusivity of food/place of food and getting positive impressions from visiting the restaurant. During the in-depth interview, the respondents showed a high emotional response to such attributes of food on the trip as "unusual interior", "new combination of tastes", "non-standard presentation of traditional dishes". The feedback received differs from the respondents ' assessments in the questionnaire. "Exclusivity" received an average score of 6.6 out of 10; "features of the ritual of eating" - 4.7 out of 10. The discussion of the obtained data can be connected with contradictions in the rational and emotional aspects of the perception of food on a tourist trip. At a rational level, the Russian

tourist is focused on obtaining quality goods and services. While at the emotional level dominates the installation of unforgettable emotions and impressions.

The impression of a tourist from food can be associated not only with an exclusive, new experience but also with a special friendly attitude, increased comfort and attention to the successful communication of restaurant staff and tourists. In this case, small family restaurants can form a competitive advantage due to the cosy atmosphere, quick response to customer requests. In a tourist trip, most tourists are more or less exposed to stress about the flight, the quality of the room Fund, the change of the usual situation, etc. In this case, the comfort of the tourist food, the hospitality of restaurateurs and the friendliness of the staff reduces the level of anxiety, stabilizes the psycho-emotional state of the traveller. This fact does not reduce the importance of tourists getting new exclusive experiences, but creates a niche for small/family restaurants. The development of this segment in the restaurant business directly ensures the formation of the tourist attractiveness of the territory, creating a sustainable tourist orientation to re-visit. As the results of the study showed hospitality and friendly service are more important criteria for choosing a restaurant than the presence of entertainment, non-standard atmosphere, unusual dishes.

The results of the study allowed to determine the discussion of some characteristics of tourist food. Although the fact that photographing food is not a common practice among Russian tourists, visualization of food and photo replication in social networks has a significant impact on the formation of positive impressions. There are differences in the estimates of impressions received from visiting the restaurant in the groups of respondents who do not take pictures of food and those who took a photo and posted it on social networks. Getting likes and approval of the reference social group is a mechanism that reinforces positive impressions.

It should be noted that the results of the study, which illustrate the low prevalence of food photographing practices, raise doubts. This may be due to some distortion. In particular, for the Russian mentality, replicating photos of food and restaurant interiors are not yet a socially approved practice. This phenomenon is usually associated with the desire to show a high social status, imitation of their consumer capabilities.

Future research and limitations

The gastronomic aspect of modern tourism is becoming increasingly important. The popularization of restaurant visiting practices, the emergence of new trends in tourists ' nutrition (photo replication in social networks, giving additional socio-cultural meaning to visiting cafes/restaurants as an integral part of social status and maintaining the image) actualizes the study of gastronomy as a tourist marker of the region. The value of food consumption affects the tourist's perception of the attractiveness of the territory. The study showed the importance of such characteristics of food as "hospitality", "comfort" and "individual approach". These characteristics are centered in the segment of small family restaurants/cafes, which create additional competitive advantages.

Along with this, the positive experience of tourists is associated with the exclusivity of the meals/food points visualization features. These characteristics of food have a high degree of discussion, which is associated with differences in the rational and emotional perception of a tourist visiting a restaurant. In this regard, these characteristics of food can be considered as an additional incentive for the formation of a tourist's sustainable orientation to revisit the food point.

Tourism synthesizes all the variety of ideas, creating popular products, not only in the traditional tourist infrastructure, but also in the field of nutrition. A purposeful approach to the formation of positive impressions in the process of tourist food becomes a point of growth of the tourism industry. In particular, it provides increase of competitive potential of the territory, its gastronomic production, diversification of local economy, increase of inflow of tourists, growth of profit of the enterprises of the tourist industry.

The study showed the need for a deeper study of gastronomy and its relationship with the development of the tourism industry. Many aspects of a tourist's nutrition require detailed elaboration and clarification in order to develop new directions of gastronomic tourism development. Of interest is the transformation of models of consumer behavior of tourists depending on their income, lifestyle, professional status. This aspect of the study is of great importance for forecasting tourism demand, the formation of new tourism products, determining new trends in the development of the tourism industry.

References

Alonso, A. D., & Liu, Y. (2012). Visitor centers, collaboration, and the role of local food and beverage as regional tourism development tools: the case of the Blackwood River Valley in Western Australia. Journal of Hospitality & Tourism Research, 36(4), 517–536. https://doi.org/10.1177/1096348011413594

Baumann S., M. Szabo, J. Johnston (2017) Understanding the food preferences of people of low socioeconomic status. Journal of Consumer Culture. https://doi.org/10.1177/1469540517717780

Bessiere, J. (1998). Local development and heritage: Traditional food and cuisine as tourist attractions in rural areas. Sociologia Ruralis, 38(1), 21, https://doi.org/10.1111/1467-9523.00061

Bingham N., Lavau S. (2012). The object of regulation: tending the tensions of food safety. Environment and Planning A: Economy and Space, 44(7), 1589-1606. https://doi.org/10.1068/a44394

Brian H. (2018). Why do kids' menus always have chicken nuggets?: Children's observations on the provision of food in hotels on family holidays. Hospitality & Society, 8(1), 69-96.

Chen H.T, Lin Y.T. (2018). A study of the relationships among sensory experience, emotion, and buying behavior in coffeehouse chains. Service Business, 12(3), 551-573 https://doi.org/10.1007/s11628-017-0354-5

Choe, J.Y, Kim, S. (2018) Effects of tourists' local food consumption value on attitude, food destination image, and behavioral intention. International Journal of Hospitality Management, 71, 1-10.

Felten, Eric (2012), "Make Mine a Mini," The Wall Street Journal, (accessed June 7, 2013), [available at http://online.wsj.com/article/SB10001424127887323830404578143231998981460.html].

Harrington, R. J., Ottenbacher, M.C., A. Staggs, Powell F. A. (2011) Generation Y Consumers: Key Restaurant Attributes Affecting Positive and Negative Experiences. Journal of Hospitality & Tourism Research, 36(4), 431-449. https://doi.org/10.1177/1096348011400744

Han, H., Ryu, K. (2009) The roles of the physical environment, price perception, and customer satisfaction in determining customer loyalty in the restaurant industry. Journal of Hospitality & Tourism Research, 33(4), 487-510. https://doi.org/10.1177/1096348009344212

Hanks, L, Line, N.D. (2018). The restaurant social servicescape: Establishing a nomological framework. International Journal of Hospitality Management, 74, 13-21 https://doi.org/10.1016/j.ijhm.2018.01.022

Hyun, S. S. (2010). Predictors of Relationship Quality and Loyalty in the Chain Restaurant Industry. Cornell Hospitality Quarterly, 51(2), 251-267. https://doi.org/10.1177/1938965510363264

Jin, N., Line, N. D., Merkebu, J. (2015). Examining the impact of consumer innovativeness and innovative restaurant image in upscale restaurants. Cornell Hospitality Quarterly, 57(3), 268-281. https://doi.org/10.1177/1938965515619229

Josiam, B.M., Mattson, M., Sullivan, P. (2004). The historaunt: Heritage tourism at Mickey's Dining Car. Tourism management, 25(4), 453-461. https://doi.org/10.1016/S0261-5177(03)00126-2

Keller, K.L. (2012). Strategic Brand management: building, measuring, and managing brand equity. Prentice Hall, 600 p. ISBN: 0132664259, 9780132664257

Kivela, J.J. & Crotts, J. C. (2009). Understanding travelers' experiences of gastronomy through etymology and narration. Journal of Hospitality & Tourism Research, 33(2), 161–192. https://doi.org/10.1177/1096348008329868

Knight, A.J., Worosz, M. R., Todd, E. C. D. (2009) Dining for safety: consumer perceptions of food safety and eating out. Journal of Hospitality & Tourism Research, 33(4), 471-486. https://doi.org/10.1177/1096348009344211

Ko, S., Kang, S., Kang H. (2018). An exploration of foreign tourists' perceptions of Korean food tour: a factor-cluster segmentation approach. Asia Pacific Journal of Tourism Research 23 (8), 833-846.

Lee, S; Lee, K.S., Chua, B.L.; Han, H. (2017) Independent cafe entrepreneurships in Kiang Valley, Malaysia - Challenges and critical factors for success: Does family matter? Journal of destination marketing & management, 6(4). 363-374. https://doi.org/10.1016/j.jdmm.2016.05.002

Leinwand S. E., Glanz K., Keenan B.T., C.C. Branas. (2017) Inspection Frequency, Sociodemographic Factors, and Food Safety Violations in Chain and Nonchain Restaurants, Philadelphia, Pennsylvania, 2013-2014. Public Health Reports, 132 (2), 180-187. https://doi.org/10.1177/0033354916687741

Lo, Y. T., Awang, S. R., Jusoh A. (2018) The role of patron dining experience and emotions on relationship quality in chain restaurant industry, Intangible Capital, 14(3), 357-369.

Lu, L., Chi, C.G. (2018) An examination of the perceived value of organic dining. International Journal Of Contemporary Hospitality Management, 30(8). 2826-2844.

Matson-Barkat, S., Robert-Demontrond, P. (2018). Who's on the tourists' menu? Exploring the social significance of restaurant experiences for tourists. Tourism Management 69, 566-578, https://doi.org/10.1016/j.tourman.2018.06.031

Meltzer R., Rothbart M. W., Schwartz A. E., Calabrese T., Silver D., Mijanovich T., Weinstein M.(2017) What Are the Financial Implications of Public Quality Disclosure? Evidence from New York City's Restaurant Food Safety Grading Policy. Public Finance Review, 47(1), 70-201. https://doi.org/10.1177/1091142117715112

Moskwa, E., Higgins-Desbiolles, F., Gifford, S. (2015) Sustainability through food and conversation: the role of an entrepreneurial restaurateur in fostering engagement with sustainable development issues. Journal of sustainable tourism. 23(1). 126-145. https://doi.org/10.1080/09669582.2014.940046

Ottenbacher, M. C., & Harrington, R. J. (2013). A case study of a culinary tourism campaign in germany: implications for strategy making and successful implementation. Journal of Hospitality & Tourism Research, 37(1), 3–28. https://doi.org/10.1177/1096348011413593

Pelegrín-Borondo J., Arias-Oliva M., Olarte-Pascual C. (2016) Emotions, price and quality expectations in hotel services. Journal of Vacation Marketing, 23(4). 322-338. https://doi.org/10.1177/1356766716651305

Raab, C., Mayer, K., Kim, Y.-S., Shoemaker S. (2009) Price-sensitivity measurement: a tool for restaurant menu pricing. Journal of Hospitality & Tourism Research, 33(1), 93-105. https://doi.org/10.1177/1096348008329659

Rahman, N. (2009) Toward a theory of restaurant décor: an empirical examination of italian restaurants in Manhattan. Journal of Hospitality & Tourism Research, 34(3), 330-340. https://doi.org/10.1177/1096348009350635

Rezaei, N. (2017) Resident perceptions toward tourism impacts in historic center of Yazd, Iran. Tourism Geographies, 19(5), 734-755. https://doi.org/10.1080/14616688.2017.1331261

Rogach, O.V., Frolova, E.V., Ryabova, T.M., Kabanova, E.E. (2017) The role of social institutions for tourist attractiveness development in respect of Russian cultural and historical heritage. Journal of Environmental Management and Tourism, 4 (20), 911-918.

Ryu, K., & Lee, J.-S. (2017). Examination of restaurant quality, relationship benefits, and customer reciprocity from the perspective of relationship marketing investments. Journal of Hospitality & Tourism Research, 41(1), 66–92. https://doi.org/10.1177/1096348013515919

Shevyakova, A., Munsh, E., Arystan, M. (2019). Information support for the development of tourism for the diversification of the economy of Kazakhstan. Insights into Regional Development, 1(2), 138-154. https://doi.org/10.9770/ird.2019.1.2(5)

Stone, M.J., Soulard, J., Migacz, S., Wolf, E., (2017). Elements of memorable food, drink, and culinary tourism experiences. Journal of Travel Research, 57(8), 1121-1132. https://doi.org/10.1177/0047287517729758

Tussyadiah, S. P., Kausar, D. R., & M., P. K. (2018). The Effect of Engagement in online social network on susceptibility to influence. Journal of Hospitality & Tourism Research, 42(2), 201–223. https://doi.org/10.1177/1096348015584441

Urry, J. 2000. Sociology beyond Societies. London: Routledge, Ch.3, p. 36-86.

Williams, H. A., Yuan, J. & Williams, R. L. (2018). Attributes of memorable gastro-tourists' experiences. Journal of Hospitality & Tourism Research. https://doi.org/10.1177/1096348018804621

YongJin L.; Lori PG; Jinwon K. 2019. Does location matter? Exploring the spatial patterns of food safety in a tourism destination. Tourism Management, 71, 18-33 https://doi.org/10.1016/j.tourman.2018.09.016

Elena FROLOVA - doctor of sociological sciences, docent, professor of the Department of Management and Administration. efrolova06@mail.ru.
ORCID: 0000-0002-8958-4561

Tatyana RYABOVA - candidate of sociological sciences, assistant professor at the Department of Management and Administration.tani-87@inbox.ru.
ORCID: 0000-0001-8204-2412

Olga ROGACH - candidate of sociological sciences, assistant professor at the Department of Management and Administration.rogach16@mail.ru.
ORCID: 0000-0002-3031-4575

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
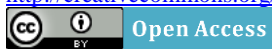
THE EFFECTS OF MANAGERIAL PERCEPTIONS ON CSR PRACTICES AND CORPORATE FINANCIAL PERFORMANCE: AN EVIDENCE FROM VIETNAM[*]

Khuong N. Mai [1], Phuong N.D. Nguyen [2*], An K.T. Nguyen [3], Ngoc M. Tran [4]

[1,2,3,4] *School of Business International University Ho Chi Minh City, Linh Trung Ward, Thu Duc District, HCMC, Vietnam*
[1,2,3,4] *Vietnam National International University Ho Chi Minh City, Vietnam*

E-mails:[1] mnkhuong@hcmiu.edu.vn ; [2] nndphuong@hcmiu.edu.vn (Corresponding author); [3]truongan@tdmu.edu.vn;
[4]minhngoc031097@gmail.com*

Abstract. Corporate Social Responsibilities (CSR) and the related topics have evolved to be the major considerations in Western and developed countries. However, this concept as well as practical application is still new in developing nations and insufficient researches addressing CSR issues. This paper aims to fill the missing gap of managerial perceptions towards CSR practices and Corporate Financial Performance (CFP) by investigating the effects of managerial perception on CSR practices and the financial outcomes reported by the managers. Following the quantitative approach, the surveys were distributed to 869 managers currently working at Ho Chi Minh City and Binh Duong Province (Vietnam) based companies doing business in different sectors, with different sizes and industries. The collected data were processed through the factor analysis and SEM. As the results, managerial perceptions serve as the powerful forces for CSR implementation. Among the four remaining CSR domains, economic responsibility is the top contributor to CFP while legal, philanthropic and environmental dimensions showed minor impacts. Several implications are provided at the end to facilitate enterprises' decision making process and governments' strategy to foster the CSR adoption status domestically.

Keywords: managerial perceptions; CSR practices; CSR financial performance; Vietnam

---

1. Introduction

Globalization has urged and empowered rational individuals to actively demand higher values contributed by operating business entities. According to Barnett and Salomon (2006), investors are strictly asking companies for financial growth in addition with societal development, even though the two tasks are believed to move in opposite way. The notion of Corporate Social Responsibility (CSR) has been mentioned frequently throughout history referring and debating about the true role of corporation in essence extending merely supplying goods and services and earning profits (economic responsibilities) and complying to laws (legal responsibilities). Factors shaping the decision whether to engage in CSR activities are but not limited to internal executive incentives (Deckop et al., 2006) and external stakeholder pressures (Agle et al., 1999). Notably, determining how CSR implementation affects company's bottom lines is an unceasing effort of numerous researchers because business leaders are supposed to critically base on financial motivation to make decisions. According to the Stakeholder Theory developed by Freeman (1984), CSR engagement can help companies yield financial interests mediated by trustful and healthy relationships with the public. Du et al (2013) added that external stakeholders in turn can experience better total welfare thanks to company's strategic CSR. However, the mixed results from studies examining the connection between CSR practices and Corporate Financial Performance (CFP) occur due to differences in research methodology (Famiola and Wulansari, 2019; Margolis and Walsh, 2003; Menassa and Dagher, 2019) as well as studied context (Hofstede, 1980; Singh and Mittal, 2019) which may impact managers' attitudes towards CSR and their actions (Batool et al., 2016; Nguyen et al., 2015; Waldman et al., 2006).

Although CSR-related papers are high in quantity in Western countries, there is still a dearth of researches taking developing nation contexts (Kisenyi and Gray, 1998), especially in Vietnam. The term CSR has appeared in Vietnam since the introduction of international companies who brought along their "Code of conducts" to ensure the coherence in their strategic management. Despite the fact that this integration has gradually been observed and adopted by domestic giants, still CSR implementation is not sufficiently paid attention because 98 percent of the current companies are small and medium in size (General Statistics of Vietnam, 2019) and have limited resources (Nguyen et al., 2015). Scandalous cases relating to legal transgression, ethical standards violation or environmental destruction still occur directly and indirectly threatening the quality of life. Several previous studies about CSR in Vietnam has been found, yet the general theme has not been addressed. Studies by Tran (2017) and Thanh et al. (2018) considered CSR practices at Small and Medium Enterprises (SMEs). Other researchers investigated the link of social responsibilities performed by corporations to consumers' attitudes and behaviors (Johar and Pham, 1999). Ho and Yekini (2014) found the positive causal nexus of CSR and CFP in Vietnam through their content analysis of 60 annual reports of 20 enterprises in 3 consecutive years. This paper also aims to clarify the impacts of CSR dimensions on financial performance, however, in another approach that exploring managers' perception towards CSR and their self-evaluation of the correlated CFP. In the paper, CSR literature will be carefully reviewed to build comprehensive conceptual model and form hypotheses. Four out of five dimensions employed to cover CSR practices are directly adopted from Carroll's Pyramid of CSR including Legal, Economic, Ethical and Philanthropic dimensions and the newly added Environmental dimension helps clearer demonstrate the current circumstances in Vietnam. According to Bortree (2014), environmental awareness has become one of the most notable facets of CSR disclosure due to high level of environmental concerns. More research focus on environmental responsibility and this topic has been receiving increase attention from academics and professions (Overton, 2018; Li et al., 2020). Further, engaging in environmental CSR practices indicates positive evaluation for CSR program of companies (Wahba, 2008) and gains good brand image (Planken et al., 2013). More importantly, environmental CSR implementation addresses stakeholder concerns for environmental challenges (Welford et al., 2008). Not only the government but also primary stakeholders have pressure on companies' activities related to protecting natural environment (Martínez García de Leaniz et al., 2019). Thus, companies in developing or developed countries cannot deny the visibility and importance of environmental CSR practices in their business performance. However, studies of relationship between

environmental CSR practices and financial outcomes provide inconclusive results (Ambec and Lanoie, 2008). Research is needed to understand effects of environmental CSR practices on business performance in different contexts. Acknowledging the importance of environmental CSR practice, the researchers aimed to add this dimension to research model for testing its effects in the particular context of Vietnam economy. Throughout the research, the following objectives will be completed: (1) to demonstrate the managers' perception towards CSR in Ho Chi Minh City and Binh Duong Province; (2) to review the related literature body about CSR practices and CFP; (3) to provide a framework addressing CSR practices and CFP in managerial perspective; (4) to discover the link between each dimensions of CSR practices on CFP; (5) to give recommendations to conduct effective CSR activities and gain financial success.

2. Literature review

The emergence of CSR has been traced back to the 1950s when dozens of theoretical and practical debates about the most comprehensive CSR definition were found. Bowen and Johnson (1953) defines CSR as the obligations, decisions and actions of businessmen that bring values to the society rather than company's short term profits. Discussions about the pros and cons as well as applications of CSR have also been addressed widely in huge number of researches with different approaches and methodologies, each with its own limitations. To depict a holistic view of CSR and specify what types of responsibility firms have to performed, Carroll (1991) came up with "the most well-known model of CSR" or the so-called "four-part definitional framework for CSR" incorporating four conceptually independent domains arranged on a pyramid. Each dimension will be reviewed and discussed later. In addition to Carroll (1991) model, Dahlsrud (2008) in his content analysis of 37 definitions of CSR attempted to draw the common patterns and categorize CSR into five explicit dimensions that are voluntariness, stakeholder, social, environmental and economic by using frequency counts. This research is going to adopt five components of CSR in which four are retrieved from Carroll's Pyramid of CSR and one additional environmental dimension from Dahlsrud (2008). Thus, it is generally understood that CSR aims to gain financial success in the manner of ethical virtue, respect involved stakeholders and environment as a whole. Besides, although different perceptions and subjects such as corporate social performance (CSP), business ethics and corporate citizenships are reviewing substantially, the CSR concept is still considered as the mainstay and employed extensively in modern businesses.

A number of researches circumscribing CSR topic have raised few questions about the managerial role in initiating and organizing socially responsible actions (Wood, 1991), despite the fact that top managers were supposed to take crucial roles regarding to this field (Quazi, 2003). In detail, (Waldman et al., 2006) and Wood (1991) argued that it is socially responsible manager inducing the whole corporation to be socially responsible. The decision made by this type of manager seemed to be toughing since the balance of corporate objectives as well as internal stakeholders' interests and social responsibilities forces the leader to weigh, deliberate and harmonically integrate to the business with the established strategy (Marta et al., 2008). At the very first phase of the process, managers need to sense the signals transmitted from the external environment (Hegarty and Tihanyi, 1999) before contemplating on the set of responses (Child, 1972). This is when individual perception joins in to orchestrate the process as it is referred to the energetic emotional manner liable for appearing to, consolidating, and inferring sensory data (Buchanan and Huczynski, 1997). Building on this definition, Álvarez and Merino (2008) defined managerial perceptions as "the substratum" closely linking to managers' personal characteristics and serving as the foundation for determine the best alternative. Furthermore, managers' attitudes, knowledge and judgement are said to be moulded by their mental models built from personal unique values, beliefs, education, demography, backgrounds and cognitive predisposition (Harrisson and Boyle, 2006; Hill and Levenhagen, 1995; Rokeach, 1973; Menon and Menon, 1997; Senge and Sterman, 1992; Thomas and Simerly, 1994) which possibly suffers from inevitable human errors, biases and imperfection. For instance, Burton and Hegarty (1999) research revealed that women are more likely to engage to CSR orientation. Campbell (1999) presented that the more risk-

avoidance tendency of the managers, the less opportunity they advance enviropreneurial marketing strategies. Thus, no manager can totally visualize and interpret the complicated business world in general and organizational system in particular (Simon, 1957). Yet, the better the upper echelon understands the environment, the better the organization performs (Downey et al., 1975; Hegarty and Tihanyi, 1999). By contrast, irrelevant interpretations of the environment can lead to catastrophic consequences (Milliken and Lant, 1990). Further researches also proved that top executives exert their power to launch and lead organization's CSR orientation as they oversee and guide the business to sustainable success (Banerjee, 2001; Waldman et al., 2006). Thomas and Simerly (1994) acknowledged that managers' perceptions play decisive role in disclosing the so-called "strategic posture" of the business describing decision makers' approach towards social demands. Ullmann (1985) stated that an active strategic posture nurtured by leader who attempts to gratify the majority of stakeholders by social responsibility exercises highly urges business to perform actual practices and disclosures. Peterson and Jun (2009) developed "the practitioner-based model of societal responsibilities" to come up with the model of managers' perspective in relation to societal responsibility. In spite of acquiring the inconsistent answers due to individual differences, the findings display the popular traditional or narrow view of managers towards CSR that instead of concerning the destiny of the world, most managers focus on responsibilities directly relating to the operations. In 2002, PricewaterhouseCoopers (PwC) surveyed 1200 CEOs from 33 countries to probe their perspective towards CSR. 70% of the participants admitted the vital role of CSR to their business no matter what economic stage they were in. In the 17th Annual Global CEO Survey (2017), PwC expanded the scope to 1344 CEOs in 68 countries to investigate their attitude towards CSR and Sustainability. Viewpoints about megatrends were classified into five groups: technological advances, demographic shifts, global economic power shift, resource scarcity and climate change, and urbanisation. The responses to the presented issues and challenges manifested managers' sustainable-oriented mind-set. As exhibited in the report, among all CEOs, 76% of them conceived that it is important to fulfil societal needs and assure well-being of the descendants (PwC 17th Annual Global CEO Survey) and 69% believed that business should balance all stakeholders' interests as it truly functions for. Recognizing the necessity of CSR, a lot of companies invent the titles such as "Corporate Responsibility Officer", "Vice President/Director of CSR", "Chief Compliance Officer", "Chief Ethics Officer" and "Investor Relations Officer" (Marshall and Heffes, 2007) to handle CSR affairs. In developing countries, personal values of managers are also described as the top internal pressure impelling corporate CSR engagement (Fernando and Lawrence, 2014). To sum up, managers' perceptions play the influential role in creating organization's awareness of CSR and cascading it to the lower level managers (Bedeian, 2002). Then, the way organization counters those issues closely connects to its singular features and culture (Bowen and Heath, 2005).

H1: Managerial perception is positively related to CSR practices
    H1-1: Manager's perception is positively related to Economic CSR
    H1-2: Manager's perception is positively related to Legal CSR
    H1-3: Manager's perception is positively related to Ethical CSR
    H1-4: Manager's perception is positively related to Philanthropic CSR
    H1-5: Manager's perception is positively related to Environmental CSR
H2: Managerial perception is positively related to Corporate financial performance

According to Carroll (1991), economic dimension refers to the fundamental role of corporations that is to generate revenue and profit to sustain and develop their business by providing goods and services. This dimension may seem unusual at first because it does not clearly demonstrate the business's contribution to the society. However, profits are urgent topics since not only shareholders and board of management are directly incentivized by financial returns but external stakeholders can also expect the values creation that benefits them while businesses strive to achieve financial objectives. Moreover, resource shortage can possibly hinder CSR performing motivation.

H3-1: Economic CSR is positively related to corporate financial performance.

Carroll (1991) also defines legal dimension as the company complying with laws whilst chasing to accomplish company's mission and vision. Companies that proactively follow different types of laws such as labor, taxation, business laws are regarded as performing legal responsibilities. Once companies decide to fulfill the dictated regulations, they need to incur the so-called compliance cost. On the contrary, companies might face the cost of non-compliance such as litigation, compensation and fines and other immeasurable costs in case they fail to obey laws. Comparing the cost of compliance and cost of non-compliance is a critical action although these two types of cost often vary across nations and industry which can lead to a certain tendency towards laws conformity. Based on the final results disclosed by Ponemon Institute and Global Scape Security Company, the costs of non-compliance are approximately 2.7 times as much as the costs companies must pay to adapt to regulations. By and large, besides explicit costs companies will unfortunately confront since violating legal requirements, there are incalculable losses they are subjected to listed as brand ruin, customers' distrust and other opportunity costs that takes them abiding years to completely recover.

H3-2: Legal CSR is positively related to corporate financial performance.

According to Irshad et al. (2007), this ethical CSR dimension refers to controlling social mores including moral standards, guidelines, values and desires of the society such as fair and just behavior for an operating business. The ethical responsibility differs from legal responsibility as the latter cannot fully encompass the multi-facets of ethics and morals (Solomon, 1994) and companies virtually need to auto-adjust themselves to the standards set by the society rather than the laws solely. Indeed, government regulations and laws derived from the urge from the society to clearly stipulate which action is right and which one is unacceptable in a particular culture and thus, is the subset of ethical responsibilities. Ethical CSR are apparently exhibited through company's respects to the stakeholder by operating with integrity, voluntary fair protection as well as human rights reverence.

H3-3: Ethical CSR is positively related to corporate financial performance.

Philanthropic responsibility – also denoted as Discretionary responsibility comprises entire types of voluntary corporate giving such as resources donation, fundraisings and other altruistic activities. As shown by the name, companies can decide whether to engage in philanthropic responsibilities without being judged and criticized by the populace (Jamali and Mirshak, 2006). However, a company satisfying this highest expectation of the society is promised to experience positive values due to being recognized as a good corporate citizen that reciprocates a portion of corporate wealth to the society which provides necessary conditions for them to thrive (Bowie, 1995). Despite that trade-off effect can happen as the expenses for philanthropy may strain company's bottom line (McWilliams and Siegel, 1995), still there are researchers such as Brammer and Millington (2008) proving that effective philanthropic CSR boosts CFP thanks to positive brand image and supports received from government, suppliers, employees and customers.

H3-4: Philanthropic CSR is positively related to corporate financial performance.

The environmental dimension of CSR practices is newly added as an independent dimension by this paper based on Dahlsrud (2008) content analysis of CSR definitions. The reason for this adoption comes from the substantial awareness and attention to environmental element from global consumers in the era of the Fourth Industrial Revolution and companies transforming to green businesses can reinforce their competitive advantages (Yusoff et al., 2015). According to Wang (2011), environmental CSR shows the endeavors and commitments from the company to preserve the natural resources as well as to protect the ecosystem during manufacturing products and delivering goods and services. The relationship between Environmental CSR and CFP has been

addressed frequently by the literature. Russo and Fouts (1997) supported the progressive nexus of environmental responsibilities and financial performance by arguing that environmental friendly companies generate favorable feelings from consumers, avoid potential risks from being fined by the government and save resources for sustainable development.

H3-5: Environmental CSR is positively related to corporate financial performance.

Based on discussed literature review, previous theoretical framework and empirical studies, a conceptual model for this study was proposed. The main constructs in the model are manager's perception towards CSR, economic CSR, legal CSR, ethical CSR, philanthropic CSR, environmental CSR and Corporate Financial Performance (CFP). Figure 1 demonstrates the assumed underlying relationships, which was built based on strong foundation of theories.
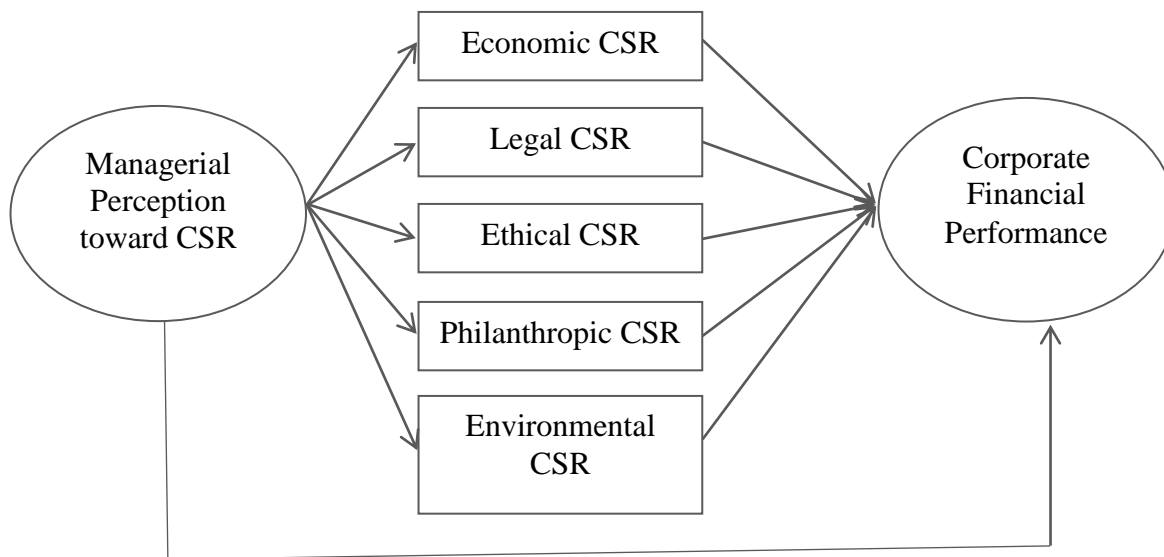
Figure 1. Proposed conceptual framework.

3. Methodology and data

Quantitative method will be used to ensure the objectiveness of collected data after statistically, mathematically and numerically analyzing. Also, in case of mapping the relations of among constructs, quantitative method is perfectly applicable. Managers working in different industry in two major locations of Vietnam – Ho Chi Minh City and Binh Duong were randomly surveyed. However, the sample will first be stratified into three major groups according to type of company they are coming from: Public, Private and FDI. CFP was constructed using a 3-item, 5-point Likert scale varied from 1 (strongly disagree) to 5 (strongly agree) in which 6 items were generated to measure managers' perceptions, 7 items to weight economic CSR, 5 items to quantify legal CRS, 5 items to measure ethical CSR, 5 items to measure philanthropic CSR, 7 items to measure environmental CSR and 3 items to measure CFP. Each item is an attitude measuring statement probing how managers evaluate the degree of CSR participation as well as financial performance in three latest fiscal years by themselves. The measurement scale was designed based on distinctive sources for each constructs and combined together. CFP was primarily measured by sales, return on equity (ROE) and return on assets (ROA) described by managers' level of agreement. The initial questionnaire was firstly composed in English and then converted into Vietnamese for use.

A total of 869 valid answers were received after distributing the questionnaire to the target sample. Online questionnaires were sent to the Departments of Planning and Investment of two selected cities for distribution to targeted managers. Furthermore, printed surveys were also spread to accessible managers in nearby companies in Ho Chi Minh City. Then, face and content validity using SPSS was executed to ensure reliability measuring scale from 38 to 33 items, 5 items of ethical CSR were eliminated due to low factor loadings before establishing SEM using AMOS. In details, before conducting EFA to identify the latent factors, the reliability test for each individual construct was employed. Cronbach's Alphas were restated again after the authors ended up with the underlying factors. Next, the Confirmatory Factor Analysis (CFA) – a multivariate statistical procedure was executed to test how well latent variables in the prerequisite stage represent the constructs. After CFA, firm evidence will be provided to reinforce hypotheses testing results. This study adopted principal component analysis (PCA) as the method for SEM analysis. According to Diamantopoulos et al. (2000), model fit is evaluated by the series of indices: Chi-square / Degree of Freedom (CMIN/df), p-value, Root Mean Square Residual (RMR), Comparative Fit Index (CFI), Goodness of Fit Index (GFI), Tucker and Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA) and Akaike Information Criterion (AIC) which are well suited for Structural Equation Modeling (SEM).

4. Results and discussions

Results from descriptive statistics revealed that the sample is greatly diverse as surveyed managers came from companies in different business sectors, types, sizes with different annual revenue and positions. As shown in Table 1, the representatives from Ho Chi Minh City based companies (62.37%) outnumbered ones from Binh Duong Province (37.63%). Most respondents are Deputy Managers (25.20%) and only a few of them are Chief Accountant (6.67%). More than half of the sample is currently working in Private business sector (59.26%) and this is also the case for business size which the size of 10 to 200 employees made up 58.92% of the three classifications. Almost half of the sample (43.27%) fell into business type of "Trade and Services"; the other "Real Estate" and "Manufacturing" respectively account for 17.03% and 39.70%. In terms of annual revenue, the highest percentage of respondents 38.67% shared that their companies earn from 11 to 50 billion VND, while 25.09% is for "50 – 200 billion VND", 18.30% for "1 to 10 billion VND" and 17.95% for "200 billion VND and above" listed in descending order. Because the sample demography somehow captures the business environment here in the two typical commercial areas in the South that are considered to be pioneers in CSR adoption, it is endorsed by the authors to realistically reflect the overall characteristics of business in Vietnam.

As mentioned previously, an EFA with the calibrated sample of 869 using PCA approach with Varimax method of rotation was employed to diminish the number of initial observed variables and find the latent components. The number of extracted factors is determined by the the number of eigen-values exceeding 1.0. Moreover, in case the factor loadings of an item happened to be less than 0.4 (Hair et al., 1998) or cross-loadings appeared to be greater than 0.3 (Jabnoun and Al-Tamimi, 2003) between two arbitrary items, the item(s) were eliminated. Table 3 presents a four-CSR factor underlying structure labeled as Environmental CSR, Legal CSR, Economic CSR and Philanthropic CSR which together explained 51.976% of the total variance was obtained after two rounds of examination and item removal. Besides the whole Ethical CSR pillar was deleted, EcoCSR5 and EcoCSR7 were also excluded as not passing the predetermined constraints. The Cronbach's Alpha was run again for the Economic CSR dimension (0.737) and satisfied the lower limit of 0.70 (Hair et al., 2010). The authors conclude that the overall scale and the four extracted factors are validated to be reliable. The final KMO of 0.944 after dropping 7 items was recognized as "Marvelous" and the p-value from Bartlett's test of sphericity (0.000) lower than 0.05 or 5% confirm that the results of factor analysis were useful.

Subsequently, a CFA was employed on the validated sample of 869 to test whether the CFA model and the data structure are acceptably fit with each other. The fit indices of the measurement model are demonstrated and evaluated in Table 1.

The results from Table 4 verified that the measurement model was fitted to all indices ($\chi2$= 2.475, df = 203, p = .000, GFI = .947, TLI = .945, CFI = .951, RMSEA = .041). Also, there are no distinguishing differences between CFA (SFL) and EFA loadings, indicating that the structure of CSR practices after the EFA was generally validated in the CFA.

Table 1. Summary of factor analysis and feasibility analysis

Factor and measured items	EFA (n=869)	CFA (n=869)		
	Loading	SFL	SMC	Composite Reliability
Environmental CSR (Cronbach's Alpha = .837)				
EnCSR4: Use of eco-friendly materials	.707	.673	.452	
EnCSR6: Minimize and recycle wastes	.675	.672	.451	
EnCSR5: Reduce energy consumption	.668	.665	.443	
EnCSR3: Avoid pollution	.645	.633	.401	.838
EnCSR7: Environmental label of products	.619	.664	.441	
EnCSR1: Programs of minimizing negative impacts	.595	.628	.395	
EnCSR2: Protect and improve natural environment	.595	.629	.395	
Legal CSR (Cronbach's Alpha = .789)				
LeCSR4: Currently issued laws	.739	.621	.386	
LeCSR2: Legal regulations	.716	.700	.489	
LeCSR1: Paying taxes	.630	.644	.415	.754
LeCSR5: Respects of agreement	.620	.668	.447	
LeCSR3: Legal standards of products	.603	.639	.408	
Economic CSR (Cronbach's Alpha = .737)				
EcCSR1: Profitability	.738	.550	.302	
EcCSR4: Benefits for employees	.587	.678	.459	
EcCSR3: Productivity	.550	.623	.389	. 740
EcCSR2: Creating jobs	.483	.575	.331	
EcCSR6: Customer satisfaction	.458	.580	.336	
Philanthropic CSR (Cronbach's Alpha = .751)				
PhiCSR2: Collaboration with local businesses	.711	.577	.333	
PhiCSR5: Dedication to society development	.662	.642	.412	
PhiCSR4: Support community	.649	.632	.400	.752
PhiCSR3: Charities	.524	.641	.411	
PhiCSR1: Support education	.508	.579	.336	
	KMO = .944, Bartlett's test of sphericity: $\chi2$ = 6333.909, p < .000	$\chi2$ = 2.475, df = 203, p = .000; GFI = .947, TLI = .945, CFI = .951, RMSEA = .041,		

Note: EFA = Exploratory Factor Analysis; CFA = Confirmatory Factor Analysis; SFL = Standardized Factor Loading; SMC = Squared Multiple Correlation; KMO = Kaiser-Meyer-Olkin Measure of Sampling Adequacy; RMSEA = Root Mean Square Error of Approximation; GFI = Goodness of Fit Index; TLI = Tucker-Lewis Index; CFI = Comparative Fit Index

Six items of managerial perception variables and three items of CFP were run with another EFA with the same calibrated sample size of 869. As the expectations, two independent factors were extracted which explained for 55.624% of the initial observed variables. Only one round was run and no items violated that presets (See Table 2). The Cronbach's Alphas all passed the limit of 0.6 as suggested by Diamantopoulos et al. (2000), showing a strong degree of reliability. Again, KMO and p-values from Bartlett's test of sphericity confirm the usefulness of results retrieved from factor analysis.

Moreover, Table 2 indicates that the measurement model of Managerial Perception and CFP fit the data well by comparing the extracted indices with the thresholds.

Table 2. Factor Analyses of Managerial Perceptions and CFP

Factor and measured items	EFA (n=869)	CFA (n=869)		
	Loading	SFL	SMC	Composite Reliability
Managerial Perception (Cronbach's Alpha = .808)				
Percep5: Access to bank loans	.714	.615	.378	.801
Percep3: Long term profitability	.687	.710	.505	
Percep2: Relationship with the government	.659	.652	.424	
Percep1: Company image	.607	.577	.333	
Percep6: Avoid additional regulations	.606	.590	.348	
Percep4: Industry-labor relation	.505	.657	.431	
Corporate Financial Performance (Cronbach's Alpha = .706)				
FP2: Return on sales	.816	.694	.482	.707
FP1: Return on equity	.617	.638	.407	
FP3: Return on assets	.566	.671	.451	
	KMO = .855, Bartlett's test of sphericity: $\chi2$ = 2145.360, p < .000	$\chi2$ = 3.395, df = 25, p = .000; GFI = .978, TLI = .959, CFI = .972, RMSEA =.053,		

In addition, the Chi-Square decreasing from 138.020 to 84.876 exhibited in Table 2 was the result obtained after taking the cross-loading of Percept5 and Percept6 basing on their highest modification indices (Nyaupane et al., 2004). It can be reasonably rationalize that a socially responsible company believed to less suffer from harsh governmental regulations can coincidently attain better credits to financial institutions. Apart from the decrease in Chi-Square, the model fit indices all significantly improved and the loadings from the CFA emphasize the significance of the model at the 0.05 level after EFA.

After proving that the measurement model was acceptable, it is essential to establish the structural equation model (SEM) with the sample size of 869. The factors' scores were computed by taking the mean of each factor. The structural model is presented in Figure 2 below.
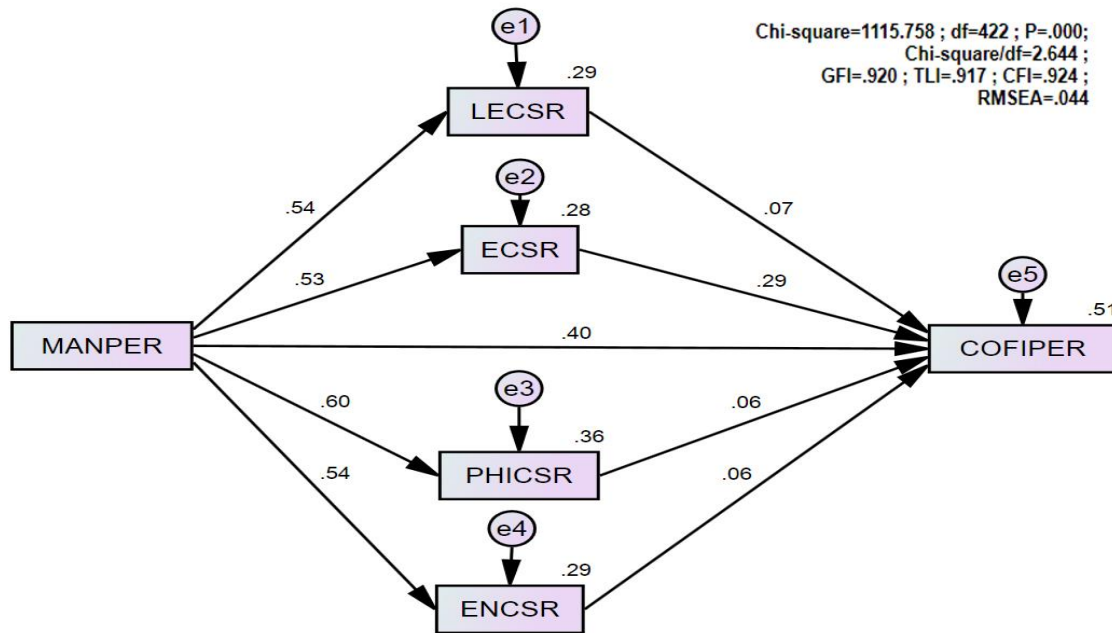
Figure 2. Modified Structural Model with Estimated Path Coefficient

According to the path coefficients shown in Figure 2, managerial perceptions toward CSR practices had significantly positive association with all four CSR dimensions comprising legal, economic, philanthropic and environmental responsibilities which then formed positive influences on CFP. Thus, hypothesis 1 (H1-1, H1-2, H1-3, H1-4; H1-5) and hypothesis 2were supported. Additionally, the direct relationship between Managerial Perceptions and CFP was also portrayed with the coefficient of 0.4 confirming that the secondary hypothesis 3 was also accepted. Based on the results from the connection among constructs, the authors can conclude that managerial perceptions towards CSR practices had positively indirect relationship with CFP through promoting the implementation of CSR in the four categories. In other words, once managers are clearly aware of the benefits receiving from CSR engagement, they are more willing to actually execute CSR activities and gain better financial performance in terms of ROA, ROE and Sales increase (See Table 3).

Table 3. Hypothesis Testing Results

	Path	Direct Effect - St. Estimate (β)	S.E	C.R.	P	Result
H1-1	MANPER → ECSR	.533	.018	18.548	***	Supported
H1-2	MANPER → LECSR	.542	.018	19.015	***	Supported
H1-4	MANPER → PHICSR	.602	.017	22.208	***	Supported
H1-5	MANPER → ENCSR	.538	.018	18.781	***	Supported
H2	MANPER → COFIPER	.403	.037	10.173	***	Supported
H3-1	ECSR → COFIPER	.292	.043	10.388	***	Supported
H3-2	LECSR → COFIPER	.072	.043	2.554	.011*	Supported
H3-4	PHICSR → COFIPER	.060	.046	2.008	.045*	Supported
H3-5	ENCSR → COFIPER	.057	.043	2.027	.043*	Supported

Squared Multiple Correlation (SMC) of the endogenous variable denoted as R^2 ranging from 0 to 1 indicates the effects that the latent variables have on the outcome variables in terms of percentage of variance caused. According to Borenstein and Cohen (1998), the R square value higher than 0.25 meaning the R value equals to

0.50 signifies the large effects in behavioral sciences. In this paper, the R^2 value of Corporate Financial Performance variable was 0.51 meaning that 51% of the total variance in CFP was explained by the structural relations in the official model.

This study's objectives were to establish and empirically test the SEM to explore how managers in Vietnam self-evaluate their companies' financial performance in terms of ROA, ROE and Sales growth with the certain level of CSR awareness and a set of important CSR practices. In the context of managers working diverse businesses operating in Ho Chi Minh City and Binh Duong Province, Vietnam, CSR practices were categorized into four underlying factors, Economic, Legal, Philanthropic and Environmental Corporate Social Responsibilities. The measurement scales were built from multiple researches containing the reliable items for measuring the proposed constructs. As the results, the final structural relation model disclosed the direct causal linkages between Managerial Perceptions and CSR Practices, CSR Practices and CFP and Managerial Perceptions and CFP. Besides, the Managerial Perceptions indirectly influenced the CFP variable through mediating CSR Practices Variables.

The Managerial Perceptions were different for the four identified dimensions of CSR practices which then had different effects on CFP. Although there are a large number of studies about CSR-CFP relationship previously, not many of them have been found to employ the similar constructs and the methodologies, thus the findings would not be equivalently compared. Famiola and Wulansari (2019), Fombrun and Gardberg (2000) and Ullmann (1985) mentioned the essential roles of mediating variables between CSR practices and CFP rather than supported their direct relationship. The research results even contradict the Managerial Opportunism Hypothesis developed by Preston and O'Bannon (1997) that postulated the negative relationship between CSR and CFP, however, partly confirm Menassa and Dagher (2019), Waddock and Graves (1997) that CSR and CFP mutually reinforce each other through a so-called virtuous circle hypothesis. On top of that, this paper advocated the Good Management Theory which posited that good adoption of CSR domains could possibly lead employee's productivity, corporate reputation, customers' satisfaction all of which cascade to financial growth. As the most salient factor explaining the variability of CFP, the economic responsibilities have been deliberated when ones raised a question about the causality. This point was hypothesized under the "Slack Resource Theory", arguing that social performance domains resulted from the availability of slack resources or companies would have more freedom to execute CSR activities once they perform great financially, in other words. Thus, this dimension is rational in this case. Further, the positive relationships between philanthropic CSR and CFP and between environmental CSR and CFP were supported by Seifert et al (2003) and Mengue et al (2005) respectively even though the CSR and CFP measures were not exactly the same. However, there are still opponents refuting these positive linkages who believed that the costs of implementation will hold companies from attaining their financial objectives. On the other hand, the results showed that managers with certain level of understandings of CSR benefits generally engage in CSR practices, which is in line with the Theory of Planned Behavior developed by Ajzen (1991) stating that an individual's behaviors are shaped by the intention toward behavior, beliefs and attitudes. Plus, Waldman et al (2006) in their study asserted that leaders truly play a crucial role in adopting and practicing CSR in their organization.

By and large, all proposed hypotheses were accepted, demonstrating that the surveyed managers perceived, implemented and assessed the payoffs from CSR practices in a positive manner. Nonetheless, while three dimensions that are legal, philanthropic and environmental responsibilities (Martínez García de Leaniz et al., 2019) subtly shadow the effects on CFP, economically orientation is the strongest contributive factors determining the improvement in CFP. The reason mostly comes from the particular business environment in Vietnam currently that micro and small enterprises whose priorities are profits, productivity and efficiency make up more than 96% of the total registered enterprises in Vietnam (GSO, 2019). In addition, as the results shown

from Van and Chan (2008), surveyed companies claimed that CSR implementation is a challenging and costly task and Thang (2008) survey of management students revealed the little knowledge about the term CSR itself. Despite that over a decade has passed since their studies and optimistic signals were noticed through this research, still managers need more time to precisely discover and gauge the payoffs from legal, environmental and philanthropic CSR.

5. Conclusions

After the discussion of the research results, the authors came up with several suggestions for enterprises and Vietnam government to promote CSR potential benefits.

For the enterprises, making efforts to boost the economic growth should be put at top priority, outshining other types of responsibilities. In other sense, companies need a meticulous and sustainable strategy for organization development. Many approaches that companies can consider to perform their economic responsibilities comprising but not limiting to profits maximization through productivity increase, marketing and sales effectiveness and product and process improvement, business expansion generating more jobs for labors and innovation for the community. Vietnam economy is growing at the fast pace with opened economic policy allowing enterprises to easily adopt and transfer new technologies, run experiments and gaining credits, especially for startups. Thus, companies' most challenging conundrum is to decide how to utilize their own resources, to invest in which assets to yield back the most before deciding which proportion of the profits should return to the society as reciprocation through philanthropic activities. Moreover, the modest positive influences of legal, philanthropic and environmental CSR domains imply that companies need more time and further attempts to practically embed these responsibilities into their corporate strategy. It also requires companies' unceasing efforts to downplay the costs along the way to achieve positive net present value. The role of a leader is strongly emphasized in this paper. To gain higher CFP in terms of ROA, ROE and sales volume, shareholders of a company need to nominate a leader having a strategic vision about CSR and drive the whole corporate to effectively and efficiently exercise CSR practices.

For the government, the critical mission is to aid companies by improving the fairness and transparency in the business environment which equipped companies with adequate conditions to achieve their financial objectives. Plus, Vietnam government needs to strive to cut the cost of legal compliance, especially under the realm of administrative procedure compliance that brings higher optimism to the companies' perception about legal compliance costs and motivation to proactively acting in accordance with laws. Furthermore, government should highlight the role of not only individual citizens but also enterprises in the common efforts of protecting and reforming the environment. By promulgating stricter environmental decrees as well as giving prominence to environment-related initiatives from pioneering enterprises, other following enterprises will have more confidence and inspiration to trigger CSR exercises.

6. Limitations and future research

The research is subjected to inevitable shortcomings with the research design and methodology explained as follows. Because the data were collected from managers working in Ho Chi Minh City and Binh Duong Province, Vietnam, research results may not reflect the general cases and be applied to other areas as well as in other developing countries. Moreover, as the sample has great diversity, this study is not centralized around a specific business sector, size, revenue, industry or manager's position. Hence, the effects of CSR practices on CFP might vary as ones trying to look into a narrower scope.

The paper also faces another problem with the methodology. As surveyed managers gave their answers to the questionnaire completely based on their attitudes and subjective evaluations, a scenario can happen when two or more managers in the same companies see different facts from one fact. It may distort the honesty and objectivity of the company's reality. In spite of the fact that the study successfully demonstrated CSR consideration under managers' prism, it did not answer why managers have such evaluations.

In final words, this study attempted to explain and predict how CFP is impacted by a structural model including managerial perceptions, economic CSR, legal CSR, philanthropic CSR and environmental CSR. In future research, more detailed CSR categories and other control and moderating variables should be integrated to the model to achieve more in-depth knowledge of the CSR-CFP link.

References

Agle, B.R., Mitchell, R.K., & Sonnenfeld, J.A. (1999). Who matters to CEOs? An investigation of stakeholder attributes and salience, corpate performance, and CEO values. *Academy of Management Journal*, 42(5), 507-525.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211.

Álvarez, M.D., & Merino, M. (2008). Environmental uncertainty: The side object of perception. *Innovar*, 18(32), 65-74.

Ambec, S., & Lanoie, P. (2008). Does it pay to be green? A systematic overview. *Academy of Management Perspectives*, 22(2), 45–62.

Banerjee, S.B (2001). Managerial perceptions of corporate environmentalism: Interpretations from industry and strategic implications for organizations. *Journal of Management Studies*, 38(4), 489–513.

Barnett, M.L., & Salomon, R.M. (2006). Beyond dichotomy: The curvilinear relationship between social responsibility and financial performance. *Strategic Management Journal*, 27(11), 1101-1122.

Batool, S., Butt, A., & Niazi, B. (2016). Types of corporate social responsibility practices across the industry in Pakistan and their effectiveness. *Developments in Corporate Governance and Responsibility*, 10, 225-246.

Bedeian, A.G. (2002). The dean's disease: How the darker side of power manifests itself in the office of dean. *Academy of Management Learning & Education*, 1(2), 164-173.

Borenstein, M., & Cohen, J. (1988). *Statistical power analysis: A computer program*. Lawrence Erlbaum.

Bortree, D.S. (2014) The state of CSR communication research: A summary and future direction. *Public Relations Journal*, 8(3),1-8.

Bowen, H.R., & Johnson, F.E. (1953). *Social responsibility of the businessman*. Harper.

Bowen, S.A., & Heath, R.L. (2005). Issues management, systems, and rhetoric: Exploring the distinction between ethical and legal guidelines at Enron. *Journal of Public Affairs*, 5(2), 84–98.

Bowie, N. (1995). New directions in corporate social responsibility, *in Hoffman, W. M., and Frederick, R.E. (Eds), Business Ethics: Readings and Cases in Corporate Morality*. McGraw-Hill.

Brammer, S., & Millington, A. (2008). Does it pay to be different? An analysis of the relationship between corporate social and financial performance. *Strategic Management Journal*, 29(12), 1325–1343.

Buchanan, D., & Huczynski, A. (1997). *Organizational behavior: An introductory text*. Prentice Hall.

Burton, B.K., & Hegarty, W.H. (1999). Some determinants of student corporate social responsibility orientation. *Business & Society*, 38(2), 188-205.

Campbell, L., Gulas, C.S., & Gruca, T.S. (1999). Corporate giving behaviour and decision maker social consciousness. *Journal of Business Ethics*, 19(4), 375-83.

Carroll, A.B. (1991). The pyramid of corporate social responsibility: Toward the moral management of organizational stakeholders. *Business Horizons*, 34(4), 39-48.

Child, J. (1972). Organizational Structure, Environment and Performance: The Role of Strategic Choice. *Sociology*, 6(1), 1–22.

Cordeiro, J., & Tewari, M. (2015) Firm characteristics, industry context, and investor reactions to environmental CSR: A stakeholder theory approach. *Journal of Business Ethics*, 130(4), 833–849.

Dahlsrud, A. (2008). How corporate social responsibility is defined: an analysis of 37 definitions. *Corporate Social Responsibility & Environmental Management*, 15(1), 1–13.

Deckop, J.R., Merriman, K.K., & Gupta, S. (2006). The effects of CEO pay structure on corporate social performance. *Journal of Management*, 32(3), 329-342.

Diamantopoulos, A., & Siguaw, J.A. (2000). *Introducing LISREL: A guide for the uninitiated*. Sage.

Downey, H.K., Hellriegel, D., & Slocum, J.W. (1975). Environmental uncertainty: The construct and its application. *Administrative Science Quarterly*, 20(4), 613-629.

Du, S., Swaen, V., Lindgreen, A., & Sen, S. (2013). The roles of leadership styles in corporate social responsibility. *Journal of Business Ethics*, 114(1), 155-169.

Famiola, M., & Wulansari, A. (2019). SMEs' social and environmental initiatives in Indonesia: An institutional and resource-based analysis. *Social Responsibility Journal*, 16(1), 15-27.

Fernando, S., & Lawrence, S. (2014). A theoretical framework for CSR practices: Integrating legitimacy theory, stakeholder theory and institutional theory. *Journal of Theoretical Accounting Research*, 10(1), 149-178.

Fombrun, C.J., & Gardberg, N. (2000). Who's tops in corporate reputation? *Corporate Reputation Review*, 3(1), 13–17.

Freeman, R.E. (1984). *Strategic management: A stakeholder approach*. Pitman, Boston.

General Statistics of Vietnam. Retrieved from https://www.gso.gov.vn/default_en.aspx?tabid=622&ItemID=18585

Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., & Tatham, R.L. (1998). *Multivariate data*. Upper Saddle River, NJ: Prentice Hall.

Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2010). *Multivariate data analysis*. New Jersey, Pearson Prentice Hall.

Harrison, J., & Boyle, E. (2006) Falling into capability learning traps: The role of the firm's predominant managerial mental models. *Management Decision*, 44(1), 31-43.

Hegarty, W.H., & Tihanyi, L. (1999). Surviving the transition: Central European bank executives' view of environmental changes. *Journal of World Business*, 34(4), 409-422.

Hemingway, C.A., & Maclagan, P.W. (2004). Managers' personal values as drivers of corporate social responsibility. *Journal of Business Ethics*, 50(1), 33–44.

Hill, R.C., & Levenhagen, M. (1995). Metaphors and mental models: Sensemaking and sensegiving in innovative and entrepreneurial activities. *Journal of Management*, 21(6), 1057–1074.

Ho, N.T.T., & Yekini, L.S. (2014). Investigating the link between CSR and financial performance: Evidence from Vietnamese listed companies. *British Journal of Arts and Social Sciences*, 17(1), 85-101.

Hofstede, G. (1980). Motivation, leadership, and organization: Do American theories apply abroad? *Organizational Dynamics*, 9(1), 42-63.

Irshad, A., Rahim, A., Khan, M.F., & Khan, M.M. (2017). The impact of corporate social responsibility on customer satisfaction and customer loyalty, moderating effect of corporate image. *City University Research Journal*, 1, 63-73.

Jabnoun, N., & Al-Tamimi, H.A.H. (2003). Measuring perceived service quality at UAE commercial banks. *International Journal of Quality & Reliability Management*, 20(4), 458-72.

Jamali, D., & Mirshak, R. (2006). Corporate Social Responsibility (CSR): Theory and practice in a developing country context. *Journal of Business Ethics*, 72(3), 243–262.

Johar, G.V., & Pham, M.T. (1999). Relatedness, prominence, and constructive sponsor identification. *J Mark Res*, 36(3), 299–312.

Kisenyi, V., & Gray, R. (1998). Social disclosure in Uganda? A research note on investigating absence. *Social & Environmental Accountability Journal*, 18(2), 16-18.

Li, J.-Y., Overton, H., & Bhalla, N. (2020) Communicative action and supportive behaviors for environmental CSR practices: an attitude-based segmentation approach. *Corporate Communications: An International Journal*, 25(2), 171–186.

Margolis, J.D., & Walsh, J.P. (2003). Misery loves companies: Rethinking social initiatives by business. *Administrative Science Quarterly*, 48(2), 268–305.

Marshall, J., & Heffes, E.M. (2007). New group pushes 'responsibility officer'. *Financial Executive*, 23(1), 11-12.

Marta, J., Singhapakdi, A., & Kraft, K. (2008). Personal characteristics underlying ethical decisions in marketing situations: A survey of small business managers. *Journal of Small Business Management*, 46(4), 589-606.

Martínez García de Leaniz, P., Herrero Crespo, Á., & Gómez-López, R. (2019). The role of environmental CSR practices on the formation of behavioral intentions in a certified hotel context. *Spanish Journal of Marketing - ESIC*, 23(2), 205–226.

McWilliams, A., & Siegel, D. (1997). The role of money managers in assessing corporate social responsibility research. *The Journal of Investing*, 6(4), 98-107.

Mengue, B., & Ozanne, L. (2005). Challenges of the green imperative: A natural resource-based approach to the environmental orientation–business performance relationship. *Journal of Business Research*, 58(4), 430–438.

Menassa, E., & Dagher, N. (2019). Determinants of corporate social responsibility disclosures of UAE national banks: A multi-perspective approach. *Social Responsibility Journal*, 16(5), 631-654.

Menon, A., & Menon, A. (1997). Enviropreneurial marketing strategy: The emergence of corporate environmentalism as market strategy. *Journal of Marketing*, 61(1), 51-67.

Milliken, F.J., & Lant, T.K. (1990). *The effect of an organization's recent performance history on strategic persistence and change: The role of managerial interpretations*. Leonard N. Stern School of Business, New York University.

Nguyen, B.T.N., Tran, H.T.T., Le, O.H., Nguyen, P.T., Trinh, T.H., & Le, V. (2015). Association between corporate social responsibility disclosures and firm value–Empirical evidence from Vietnam. *International Journal of Accounting & Financial Reporting,* 5(1), 212-228.

Nyaupane, G.P., Morais, D.B., & Graefe, A.R. (2004). Nature tourism constraints: A cross-activity comparison. *Annals of Tourism Research*, 31(3), 540-555.

Overton, H.K. (2018) Examining the impact of message frames on information seeking and processing: a new integrated theoretical model. *Journal of Communication Management*, 22(3), 327-345.

Peterson, R.T., & Jun, M. (2009). Perceptions on social responsibility: The entrepreneurial vision. *Business & Society*, 48(3), 385-405.

Planken, B., Nickerson, C., & Sahu, S. (2013) CSR across the globe: Dutch and Indian consumers' responses to CSR. *International Journal of Organizational Analysis*, 21 (3), 357-372.

Preston, L.E., & O'Bannon, D.P (1997). The corporate social-financial performance relationship. *Business & Society*, 36(4), 419–429.

PwC, PricewaterhouseCoopers. Retrieved from https://www.pwc.com/gx/en/ceo-survey/2014/assets/pwc-17th-annual-global-ceo-survey-jan-2014.pdf .

Quazi, A.M. (2003). Identifying the determinants of corporate managers' perceived social obligations. *Management Decision*, 41(9), 822-831.

Rokeach, M. (1973). *The nature of human values*. Free press.

Russo, M.V., & Fouts, P.A. (1997). A resource-based perspective on corporate environmental performance and profitability. *Academy of Management Journal*, 40(3), 534–559.

Seifert, B., Morris, S.A., & Bartkus, B.R. (2003). Comparing big givers and small givers: Financial correlates of corporate philanthropy. *Journal of Business Ethics*, 45(3), 195-211.

Senge, P.M., & Sterman, J.D. (1992). Systems thinking and organizational learning: Acting locally and thinking globally in the organization of the future. *European Journal of Operational Research*, 59(1), 137–150.

Simon, H.A. (1957). *Models of man; social and rational*. Oxford, England: Wiley.

Singh, S., & Mittal, S. (2019). Analysis of drivers of CSR practices' implementation among family firms in India: A stakeholder's perspective. *International Journal of Organizational Analysis*, 27(4), 947-971.

Solomon, R.C. (1994). *The new world of business ethics and Free Enterprise in the Global 1990s*. Boston.

Thang, T.T.N. (2008). Perception of corporate social responsibility in Vietnam - A study of executive management students. *International Vision*, 12, 107-118.

Thanh, P.V., & Podruzsik, S. (2018). CSR in developing countries: Case study in Vietnam. *Management*, 13(4), 287-300.

Thomas, A.S., & Simerly, R.L. (1994). The chief executive officer and corporate social performance: An interdisciplinary examination. *Journal of Business Ethics*, 13(12), 959–968.

Tran, T.T. (2017). *Corporate social responsibility (CSR) situation in Vietnam*. Master's Thesis. Faculty of Business Administration Lappeeranta, Saimaa University of Applied Sciences.

Ullmann, A. (1985). Data in search of a theory a critical examination of the relationship among social performance, social disclosure and economic performance. *Academy of Management Review*, 13(3), 540-577.

Van, N.C., & Chan, N. (2008). CSR-A model for sustainable social and ecological development in Vietnam? *International Vision*, 12, 49-56.

Waddock, S.A., & Graves, S.B. (1997). The corporate social performance-financial performance link. *Strategic Management Journal*, 18(4), 303–319.

Waldman, D.A., Sully de Luque, M., Washburn, N., House, R.J., Adetoun, B., Barrasa, A., & Wilderom, C.P.M. (2006). Cultural and leadership predictors of corporate social responsibility values of top management: A GLOBE study of 15 countries. *Journal of International Business Studies*, 37(6), 823–837.

Wahba, H. (2008) Does the market value corporate environmental responsibility? An empirical examination. *Corporate Social Responsibility and Environmental Management*, 15(2),89-99.

Wang, T.H. (2011). Developing web-based assessment strategies for facilitating junior high school students to perform self-regulated learning in an e-Learning environment. *Computers & Education*, 57(2), 1801-1812.

Welford, R., Chan, C., & Man, M. (2008) Priorities for corporate social responsibility: A survey of businesses and their stakeholders. *Corporate Social Responsibility and Environmental Management*, 15 (1), 52-62.

Wood, D.J. (1991). Corporate social performance revisited. *Academy of Management Review*, 16(4), 691–718.

Yusoff, A.R.B.M., Kim, D., Kim, A.P., Shneider, F.K., da Silva, W.J., & Jang, J. (2015). A high efficiency solution processed polymer inverted triple-junction solar cell exhibiting a power conversion efficiency of 11.83%. *Energy & Environmental Science*, 8(1), 303-316.

Khuong N. MAI is an associate professor, lecturer and researcher of School of Business Administration, International University, Vietnam National University- Ho Chi Minh City. He has bachelor degree in Tourism and Hospitality Management, master of science degree in leisure, tourism and environment at Wageningen University, The Netherlands, and PhD degree in development management at School of Public Administration of the National Institute of Development Administration (NIDA), Bangkok-Thailand.
ORCID ID: orcid.org/0000-0002-0527-3046

Phuong N.D NGUYEN is a lecturer and researcher of School of Business, International University, Vietnam National University Ho Chi Minh City. He earned his Ph.D in Development Administration at NIDA in Thailand. His major research focuses on public policy, sustainability, corporate strategy, customers' behavior, employee' behavior on commitment, engagement and retention.
ORCID ID: orcid.org/0000-0003-2407-6440

An K.T. NGUYEN is a Ph.D candidate at School of Business, International University, Vietnam National University Ho Chi Minh City.

Ngoc M. TRAN is a graduate student at School of Business, International University, Vietnam National University Ho Chi Minh City.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Publisher
http://jssidoi.org/esc/home

INFLUENCE OF ORGANISATIONAL AND INFORMATION SYSTEMS AND TECHNOLOGIES RESOURCES AND CAPABILITIES ON THE ADOPTION OF PROACTIVE ENVIRONMENTAL PRACTICES AND ENVIRONMENTAL PERFORMANCE

Juan Felipe Reyes-Rodríguez [1], Jairo González-Bueno [2], Gladys Rueda-Barrios [3]

[1,2,3] Universidad Pontificia Bolivariana, Faculty of Business Administration, Km 7 Vía Piedecuesta, Colombia

E-mails:[1] juanf.reyes@upb.edu.co; [2] jairoa.gonzalez@upb.edu.co; [3] gladys.rueda@upb.edu.co

Abstract. There is little evidence of the role of resources and capabilities related to information systems and technologies (IS/IT) in the adoption of proactive environmental practices in firms. The purpose of this study is to explore the influence of organisational and IS/IT resources and capabilities on the adoption of proactive environmental practices as well as the ultimate effect on environmental performance. By conducting covriance-based structural equation modelling (CB-SEM) to a multi-sample of 129 small, medium and large firms operating in different industrial sectors in Bogotá, Colombia, we found that organisational and IS/IT resources shape the development of capabilities for continuous improvement, stakeholder management, IS/IT support to general functional activities and IS/IT support to environmental management. Further, firm capabilities lead to the adoption of proactive environmental practices, which in turn, determine improvements in environmental performance. Findings support the relevance of IS/IT resources and capabilities in driving pro-environmental behaviour in firms.

Keywords: Proactive environmental practices; environmental performance; information systems and technologies (IS/IT); resource-based view of the firm (RBV)

1. Introduction

Over the past years, there has been an increasing concern for the social responsibility of firms (Arribas, Espinós-Vañó, García, & Oliver, 2019). As part of such social responsibility, particularly, attention has been paid to the preservation of the natural environmental, which demand actions from the business sector by means of rethinking their investments, strategies and operations (García et al., 2019; González-Bueno & Nuñez Rodríguez, 2018).

This implies the acquisition and development of organisational attributes strategically used in order to drive response. In this sense, the specific characteristics that influence environmental performance of an individual firm have been a matter of concern in academic studies. That is, the strategic attributes which can be managed consciously by the organisation's leadership in order to achieve superior environmental performance (Etzion, 2007).

Literature subscribed to the Resource-Based View of the firm (RBV, Barney, 1991; Grant, 1991; Wernerfelt, 1984), and the Natural Resource-Based View of the firm (NRBV, Hart, 1995; Hart & Dowell, 2011) as an extension to the natural environment, has argued for the relevance of valuable and unique resources and capabilities as drivers of corporate response to environmental concerns that have been widely approached empirically (Aragón-Correa et al., 2008; Leonidou et al., 2017; Prieto-Sandoval et al., 2019; Sharma & Vredenburg, 1998; Torugsa et al., 2012). Such a response is materialised in the form of proactive environmental practices, that ultimately can improve competitive advantage. However, controversies have arisen around such a relationship and thus, it is a topic that remains under study (Arribas, Espinós-Vañó, García, & Tamošiūnienė, 2019; García et al., 2020). Proactive environmental practices are defined here as organisational actions and decisions concerning the development and introduction of new or improved products, processes, and/or management systems so as to mitigate negative impacts on the natural environment (González-Benito & González-Benito, 2005; Reyes-Rodríguez et al., 2016).

On the other hand, RBV-related studies show a strategic perspective of information systems and technologies (IS/IT), in which competitive valuable resources and capabilities related to IS/IT are characterised as key contributors to the development of organisational strategies and boost competitive advantages (Bharadwaj, 2000; Bhatt & Gover, 2005; Mata et al., 1995; Ravinchandran & Lertwongsatien, 2005; Wade & Hulland, 2004). Further, a growing number of studies has investigated the relevance of IS/IT in connection with the adoption of proactive environmental practices (Benitez-Amado & Walczuch, 2012; Ghobakhloo et al., 2018; Hanelt et al., 2017; Seidel et al., 2013). Yet, they have approached predominantly IS/IT as an attribute that contributes in isolation to the implementation of proactive environmental practices rather than as an attribute that jointly operates with other resources and capabilities for such a purpose.

This study subscribes to the RBV framework and attempts to addressing the above mentioned gap in literature by responding whether and how both organisational and IS/IT resources and capabilities influence the adoption of proactive environmental practices and ultimately an improved environmental performance. In doing so, two organisational capabilities: continuous improvement and stakeholder management are explored together with IS/IT capabilities. We hypothesise that such capabilities are proceeded by the existence of organisational and IS/IT resources, and influence the adoption of proactive environmental practices, which in turn improves environmental performance in firms.

Based on data from 129 small, medium and large firms operating in different industrial sectors in Bogotá, Colombia, the paper's contributions are three-fold: (i) an extension of the RBV framework in the context of environmental management by integrating both organisational and IS/IT resources and capabilities; (ii) an enhanced understanding of the role of IS/IT in the pursuit of environmental sustainability in organisations; and (iii) a validation of the research model in a developing country setting.

The following section presents the literature review and hypotheses development. Then, a description of the research methods and design is detailed, followed by the presentation of the study results and analysis. The remaining sections include the discussion of the key findings and an outline of the conclusions of the research.

2. Theoretical foundations and research hypotheses

Literature provides an understanding of proactive environmental practices as a way to boost competitiveness. Under this perspective, the RBV has been considered as a dominant theoretical driving force, arguing that the management of the interface between business and the natural environment comprises the development of organisational capabilities that are built on firm-specific key resources (Chan, 2005; Hart, 1995; Prieto-Sandoval et al., 2019). In the strategic management literature, firm resources are considered as a major antecedent of a strategy (Grant, 1991) and are characterised by their value, non-substitutability, and non-perfect imitability (Barney, 1991).

Firms control resources to take actions for improve efficiency and effectiveness (Barney, 1991). They are categorised as physical, human and organisational and are inputs of production processes (Grant, 1991). Resources differ from capabilities as resources constitute the raw input to support the business activities of the firm, whereas the latter are organisational routines that imply the interaction and complex coordination of the former (Barney, 1991; Grant, 1991). Hence, resources can be viewed as the antecedent of organisational capabilities. In the realm of environmental issues, this suggested relationship holds as experiential, financial and allied resources that are critical for strengthening firm's capabilities associated with the greening of the business (Leonidou et al., 2017).

Under this perspective, we advance in proposing a conceptual model that with the research hypotheses of the study (see Figure 1), which are discussed below.
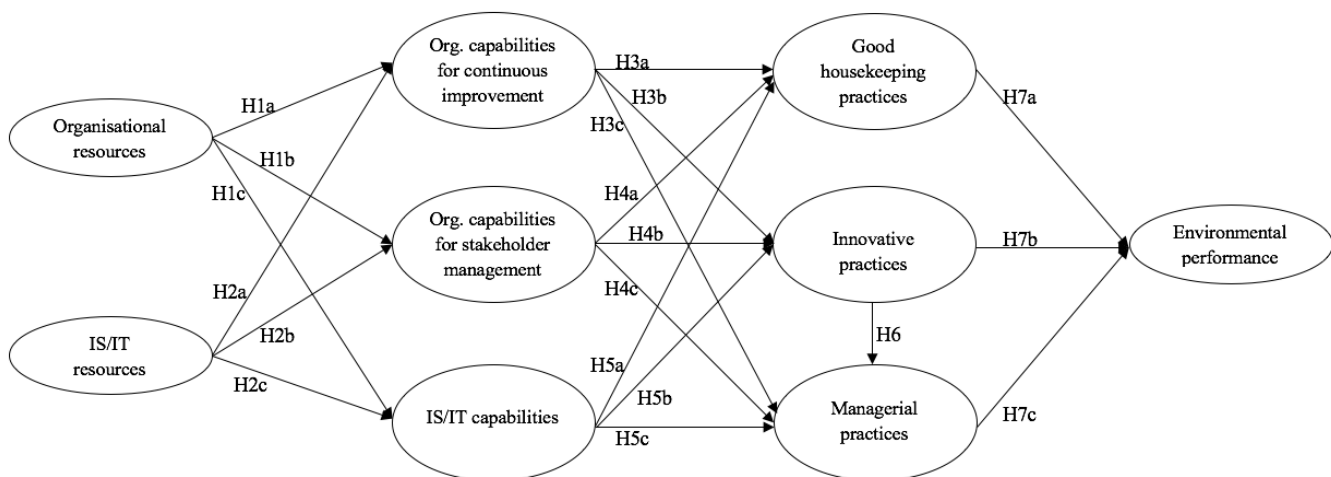
Fig. 1. Conceptual model

Empirical validations in literature on environmental management have approached certain organisational capabilities such as continuous improvement and stakeholder management, which are essential for the adoption of proactive environmental practices (Caldera et al., 2018; Sharma & Vredenburg, 1998; Torugsa et al., 2012). The former refers to the ability to continuously generate innovations resulting from organisational efforts to reduce, minimise and prevent pollution (Hart, 1995; Sharma & Vredenburg, 1998). The latter indicates the ability to establish trust-based collaborative relationships with stakeholders in order to achieve environmental goals (Sharma & Vredenburg, 1998; Torugsa et al., 2012). Developing such organisational capabilities requires holding together heterogeneous and multiple resources across different functions and levels (Leonidou et al., 2017). For instance, physical and technological resources for continuous improvement regarding the redesigning of

production processes (Chan, 2005; Nuhu, 2016; Russo & Fouts, 1997). Human resources are also required for the stablishment of a culture that facilitates the innovation (Rueda-Barrios et al., 2018), which entails an effective application of eco-friendly technologies and properly interact with stakeholders to build strong relationships (Chan, 2005; Torugsa et al., 2012).

On the other hand, IS/IT have been regarded as a strategic factor that influence a firm's ability to enhance performance (Ray et al., 2005; Wade & Hulland, 2004). In this sense, IS/IT capabilities become a relevant construct, referring to an enterprise-wide capability to leverage technology to differentiate from competition that goes beyond a set of sophisticated technological functionalities (Bharadwaj, 2000). They constitute socially complex routines that enable the delivery of information-related services to the organisation and ultimately contribute to competitiveness (Ravinchandran & Lertwongsatien, 2005). In accordance with the RBV, the complexity of IS/IT implies the firm's ability to mobilise and expand IS/IT-related resources in combination with other resources and capabilities so as to contribute to business value (Bharadwaj, 2000; Ravinchandran & Lertwongsatien, 2005). Hence, it is expected that a wide variety of organisational resources (e.g., physical, human, organisational, etc.) to be involved for developing such capabilities. We thus formulate the following hypotheses:

Hypothesis 1a: There is a positive effect of organisational resources on the development of organisational capabilities for continuous improvement.

Hypothesis 1b: There is a positive effect of organisational resources on the development of organisational capabilities for stakeholder management.

Hypothesis 1c: There is a positive effect of organisational resources on the development of IS/IT capabilities.

IS/IT resources, considered as assets and capabilities of the company, do not lead to higher performance of the company by themselves. This kind of resources are mediated by organizational capabilities, these capabilities in turn positively affect the performance of the company becoming a source of sustained competitive advantage (Borek et al., 2012; Uwizeyemungu et al., 2018). IS/IT resources serve as a means to complement organisational processes and contributes to creating business value (Pang et al., 2014). Mata et al. (1995) conceptually approach attributes proper of IT, highlighting the managerial IT skills. Similarly, Wade and Hulland (2004) provide a typology of specific IS resources and emphasize resource complementarity in order to study their effect on firm performance. Marhraoui and El Manouar (2020) state that bundles of key IS/IT resources such as IS/IT infrastructure and IS/IT human resources are enablers of more complex or higher-level organisational attributes and therefore, key to the sustainable performance of companies. Likewise, Ridwandono and Subriadi (2019) argue that IS/IT resources are contribute to improve organizational capabilities and therefore the performance of organisations.

Considering continuous improvement and stakeholder management as such higher-level attributes, it is naturally expected that IS/IT resources become essential for the strategic purpose of these capabilities. On the one hand, corporate efforts to continuously improve processes, operations and procedures requires handling, displaying and analysing information, tasks that are performed through the use an infrastructure in IS/IT and the mobilisation of human resources and technical skills in IS/IT. On the other hand, building trust-based relationships with critical stakeholders takes place on the basis of the adequate and fluid exchange of information, which also demands the deployment of these IS/IT-related resources.

As previously mentioned, the notion of IS/IT capabilities points to the ability of a firm to mobilise, implement and expand IS/IT resources in combination with other resources and capabilities (Bharadwaj, 2000; Ravinchandran & Lertwongsatien, 2005; van de Wetering, 2019). Hence, IS/IT resources are building blocks og IS/IT capabilities.

Bharadhaw (2000) states that IS/IT capabilities comprise five dimensions: technological infrastructure, human IS/IT talent, knowledge, relationships and architecture. Empirical work has evidenced the influence that resources such as IS/IT human capital, IS/IT infrastructure flexibility, and IS/IT relationship quality directly affects IS/IT capabilities in the functional side (Ravinchandran and Lertwongsatien, 2005). Correa Ospina and Díaz Pinzón (2018) argue that there are relationships among IS/IT resources to build up IS/IT capabilities as enablers on organisational performance. Given the above discussion, the following hypotheses are suggested:

Hypothesis 2a: There is a positive effect of IS/IT resources on the development of organisational capabilities for continuous improvement.

Hypothesis 2b: There is a positive effect of IS/IT resources on the development of organisational capabilities for stakeholder management.

Hypothesis 2c: There is a positive effect of IS/IT resources on the development of IS/IT capabilities.

The abovementioned organisational capabilities for continuous improvement and stakeholder management correspond to the original 'strategic resources' constructs devised by Hart (1995), associated to specific 'strategic environmental capabilities' related to pollution prevention and product stewardship (Aragón-Correa et al., 2008; Caldera et al., 2018; Christmann, 2000; López-Gamero et al., 2009; Sharma & Vredenburg, 1998). Continuous improvement has been particularly associated to the adoption of pollution prevention in the form of good housekeeping practices as well as innovative practices since they require companies to develop resources such as physical assets, technologies and skills, and cross-functional integration (Russo & Fouts, 1997) to change the experiential base of organizational activities, routines, and goals (Sharma & Vredenburg, 1998). Stimuli to waste minimization are also related to "the capacity of organizations to engage in collaborative learning and continuous improvement on a number of fronts" (Vickers & Cordey-Hayes, 1999, p. 89). Further, continuous improvement capabilities becomes a natural approach when adopting environmental practices related to managerial aspects when working towards the meeting of certifiable international standards (Heras-Saizarbitoria et al., 2020; Prieto-Sandoval et al., 2019). In sum, capabilities for continuous improvement comprises the ability to create new environmental initiatives materialised into products, processes and involves the initiation of changes in environmental policies and activities (Albertini, 2019; Boakye et al., 2020). Thus, the following hypotheses are thus, formulated:

Hypothesis 3a: There is a positive effect of organisational capabilities for continuous improvement on the development of proactive environmental practices related to good housekeeping practices.

Hypothesis 3b: There is a positive effect of organisational capabilities for continuous improvement on the development of proactive environmental practices related to innovative practices practices.

Hypothesis 3c: There is a positive effect of organisational capabilities for continuous improvement on the development of proactive environmental practices related to managemerial practices.

On the other hand, proactive environmental practices in terms of product-stewardship are related to a stronger stakeholder orientation by the inclusion of their perspectives in the processes of product-development and planning (Caldera et al., 2018; Hart, 1995; Torugsa et al., 2012). As previously mentioned, a stakeholder management capability is based on trust-based collaborative relationships with a variety of stakeholders (Sharma & Vredenburg, 1998; Vishwakarma et al., 2019). Through collaborative relationships with stakeholders, firms can learn more about how firm's operations should be, the improvement of routines and operations, better approaches to product lifecycle assessment and the designing of more environmentally friendly products that meet the expectations of customers and suppliers (Albertini, 2019; Salem et al., 2016). In general, such relationships can

provide direction and course of action of the strategy and the managerial dimension in which proactive environmental practices are embedded (Albertini, 2019; Buysse & Verbeke, 2003). Therefore, organisational capabilities for stakeholder management becomes an antecedent of the implementation of proactive environmental practices. The following hypotheses are thus, formulated:

Hypothesis 4a: There is a positive effect of organisational capabilities for stakeholder management on the development of proactive environmental practices related to good housekeeping practices.

Hypothesis 4b: There is a positive effect of organisational capabilities for stakeholder management on the development of proactive environmental practices related to innovative practices.

Hypothesis 4c: There is a positive effect of organisational capabilities for stakeholder management on the development of proactive environmental practices related to managerial practices.

Firm's IS/IT capabilities refer to the ability to mobilise and deploy specific IS/IT resources effectively combined with other resources and capabilities so that superior performance is achieved (Bharadwaj, 2000). They include experience and relational infrastructure (Bhatt & Gover, 2005), that, when channelled, lead to the adoption of distinctive strategies and the development of competencies (Ravinchandran & Lertwongsatien, 2005).

IS/IT capabilities imply features for monitoring, analysis, and display of information (e.g., resource consumption, environmentally harmful outputs, etc.) that allows the organisation to make sense of the situation and in turn reconsider beliefs, routines and actions. This provides the ground for the implementation of proactive environmental practices (Seidel et al., 2013). IS/IT capabilities are relevant for storing, managing, and displaying information for the implementation of proactive environmental practices related to managerial aspects (De Camargo Fiorini et al., 2019). For instance, information on human and financial resources as well as audits and periodic evaluations assist in the establishment and dissemination of goals and the benchmarking of activities to improve current practices towards environmental protection (Benitez-Amado & Walczuch, 2012; De Camargo Fiorini et al., 2019). In the same vein, IS/IT capabilities boost the internal transfer of tacit and explicit knowledge on regulations and best practices in connection with environmental protection between business units and/or functional departments (Benitez-Amado & Walczuch, 2012; Sharma & Vredenburg, 1998; Yousif et al., 2017).

At operational level, IS/IT capabilities are key for the exchange of information and knowledge related to lifecycle assessment practices as they require dealing with sorts of information not only from manufacturing-related data but also from suppliers, audits and surveys (Ghobakhloo et al., 2018; Melville, 2010). Market intelligence enabled by IS/IT capabilities may allow firms to sense and seize opportunities in order to respond proactively by the development of environmentally friendly products and services (Benitez-Amado & Walczuch, 2012). On the other hand, IS/IT capabilities can assist the selection of suppliers based on green criteria and collaborative production management across the supply chain in order to enable environmentally friendly product development (De Camargo Fiorini et al., 2019; Ghobakhloo et al., 2018). Furthermore, the management and control of environmentally-related indicators in production processes (e.g., waste, energy consumption, toxic material, water use, etc.) reduces uncertainties and assists decision making for the improvement of eco-efficiency of the business processes. Less uncertainties about processes help the targeted implementation of technological alternatives with reduced environmental impact (Hanelt et al., 2017). Given the above, we propose the following hypothesis:

Hypothesis 5a: There is a positive effect of IS/IT capabilities on the development of proactive environmental practices related to good housekeeping practices.

Hypothesis 5b: There is a positive effect of IS/IT capabilities on the development of proactive environmental practices related to innovative practices.

Hypothesis 5c: There is a positive effect of IS/IT capabilities on the development of proactive environmental practices related to managerial practices.

Environmental innovations and practices related to managerial aspects are related. That is, the establishment of management related environmental practices emerges as a result of planned environmental innovations (Rehfeld et al., 2007). The implementation of managerial practices such as environmental management systems is closely linked to pre-existing component of tacit knowledge derived from innovative practices that comprise reformulation and improvement of products, services and processes (Amores-Salvadó et al., 2015; Dragomir, 2020). Such a knowledge becomes a baseline for the formulation of environmental goals and the shaping of policies. Proactive practices in managerial aspects constitute a form of organisational capital (procedures and norms) that guides the greening of the firm provided the technological capital that results from innovative practices in environmental management (Amores-Salvadó et al., 2015; Nemlioglu & Mallick, 2017). In other words, proactive environmental practices related to tangible innovations in products provides the basis for the adoption of proactive environmental practices related to intangible managerial aspects (Ziegler & Seijas Nogareda, 2009). Based on this, the following hypothesis is stated:

Hypothesis 6: There is a positive effect of proactive environmental practices related to innovative practices on the adoption of proactive environmental practices related to managerial practices.

Finally, it is of interest to study the effect of proactive environmental practices on firm's environmental performance. Judge and Douglas (1998) refer to environmental performance as the effectiveness of the firm to meet and exceeding social expectations with respect to the natural environment. That is, the ability of the firm to successfully meet and exceed those expectations. Literature has shown a relationship between environmental practices and performance (Chan, 2005), and that those differentiated proactive environmental practices result in dissimilar outcomes on environmental performance (Betts et al., 2018; González-Benito & González-Benito, 2005; López-Gamero et al., 2009). Therefore:

Hypothesis 7a: There is a positive effect of proactive environmental practices related to good housekeeping practices on environmental performance.

Hypothesis 7b: There is a positive effect of proactive environmental practices related to innovative practices on environmental performance.

Hypothesis 7c: There is a positive effect of proactive environmental practices related to managerial practices on environmental performance.

3. Methods

3.1 Sample and procedures
We collected data from 129 firms participating in the first and second stages, out of five, of a two-year assistance and education programmes promoted by the Secretary of the Environment of Bogotá, Colombia called Corporate Environmental Management (*Gestión Ambiental Empresarial*) in 2018. The program intended to engage firms in environmental improvement (see Parker et al., (2009) about this type of programs in general). By addressing these firms, we made sure that they are under the process of acting towards the natural environment by means of the implementation of practices at both operational and managerial levels. In terms of size, the sample consisted of 107 firms performing manufacturing activities in sectors such as paper and printing, chemical, pharmaceutical, metalmechanics, food and beverages, textile, furniture, automotive and oil, wood transformation, and other

manufacturing activities. The remaining 22 firms operated in service-related sectors such as healthcare, professional and personal services as well as transportation and logistics. In terms of size, according to the classification of the European Commision (Eurostat, 2020), the sample consisted of 49 small firms, employing between 10 and 49 employees; 57 medium-sized firms, employing between 50 and 249 employees; and 23 large firms, employing more than 250 employees.

Prior to the data collection, an early version of the survey instrument was developed by including items from previous studies as well as adaptations based on findings of a qualitative stage prior to this study. Then, a pilot study was performed, which consisted of the application of an initial paper-based questionnaire to 73 firms participating in the programs administered by Bogotá's Secretary of the Environment. Based on the results of validation of the instrument, some adjustments ware made and an on-line version of the questionnaire was then sent to representatives (i.e., general managers, environmental managers, and environmental assistants) of the firms.

After sending the final, on-line questionnaire to a population of 360 firms, 189 questionnaires were returned, which represented 51% of response rate. Then, procedures to verify the quality of data were carried out since the survey was applied to a pre-recruited non-probabilistic panel (Couper, 2000). We followed the most relevant procedures associated to web-based studies: diversity of respondents, seriousness of responses (i.e., repeatedly endorsing items regardless of content, or acquiescence), and repeated responses (Gosling et al., 2004; Sax et al., 2003). As a result, 22 questionnaires were discarded.

Nonresponse bias (Armstrong & Overton, 1977) was tested by carrying out wave analysis. Firms who responded right after the survey was made available were compared with those who responded after a first and second reminders. Comparisons of survey results revealed no statistically significant differences between the three groups at the level of demographic variables. Then, 38 further questionnaires were excluded because they came from firms with ten or less employees. Environmental awareness or eco-literacy are low in most micro-enterprise owners since financial and human resources are limited, which limits voluntary action (Mir & Feitelson, 2007). After following these procedures, the 129 cases were retained in the sample for subsequent analyses.

Data from the final sample were analysed following this sequence: a characterisation of the sample, an exploratory principal component analysis (EPCA), confirmatory factor analysis (CFA), and covariance-based structural equation modelling (CB-SEM).

3.2 Measures

Variable selection in environmental management, and in general sustainability-related studies, is critical (Arribas, Espinós-Vañó, García, & Morales-Bañuelos, 2019). We adapted items from the literature and used Likert scales (see Appendix).

Some constructs of the questionnaire were measured with the 7-point Likert scale and others with the 5-point scale. The scales were implemented according to the nature and intention of the construct. For the constructs that measured the company's attitude (attention, relationship, adoption, and use), scales from 1 to 5 were used: Stakeholder management, IS/IT capabilities and proactive environmental practices. For the constructs that measured the availability of resources and performance evaluation of the company, scales from 1 to 7 were used: organizational resources, IS/IT resources, continuous improvement and environmental performance. We considered to respect the scales originally proposed by the authors and which were validated in their studies, also with the purpose of comparing our results with those of these sources. However, this is not a limitation since the proposed scales are not mixed within the same construct, and therefore there are no differences between the weight of the variances of the same construct.

The underlying structure among the variables was evaluated through EPCA with varimax rotation and reliability estimates were calculated (Hair et al., 2009). All loadings of items were equal or above to .600 after performing EPCA. Construct measurements are presented as follows:

Organisational resources: Seven items, including several from Chan (2005) assessed the availability of resources in the firm using a seven-point scale (1 = "scarce" to "7 = very abundant"). After the EPCA, six items were retained constituting one single factor.

IS/IT resources: Seven items were adapted from Byrd and Turner (2000) and Ravinchandran and Lertwongsatien (2005) to assess the degree of each respondent's agreement using a seven-point Likert scale, ("1 = completely disagree" to "7 = completely agree"). They formed one single factor after EPCA.

Continuous improvement. Four items drawn from Sharma and Vredenburg (1998) assessed the degree of each respondent's agreement using a seven-point Likert scale, ("1 = completely disagree" to "7 = completely agree"). Three of them were retained and formed one factor after EPCA.

Stakeholder management. Based on the approach of Aragón-Correa *et al.* (2008), six items assessed separately—in two complementary statements—the attention given by each firm to different types of stakeholders, as well as the influence of each stakeholder has on the firm's environmental management decisions. Measures consisted of a five-point scale ("1 = none" to "5 = great attention" or "5 = very strong influence"). The combined measure results from multiplying the scores assigned to importance and attention. The six items formed one single factor after EPCA.

IS/IT capabilities: Eleven items adopted in part from Ravinchandran and Lertwongsatien (2005) assessed the extent of use of IS/IT to several functions and activities using a five-point scale (1 = "none" to "5 = very much"). After EPCA, only seven items were retained and organised in two factors, labelled as "IS/IT support to general functional activities" and "IS/IT support to environmental management".

Proactive environmental practices. Seventeen items, several drawing from Christmann (2000), Chan (2005), and Aragón-Correa et al. (2008) assess the degree of adoption of proactive environmental practices using a five-point scale ("1 = we have not considered this issue at all" to "5 = we are leaders in this practice in our sector"). After EPCA, ten of these items were retained in three factors—labelled as "Good Housekeeping Practices", "Innovative Practices", and "Managerial Practices".

Environmental performance. Four items adapted from Karagozoglu and Lindell (2000) assess relative environmental performance, compared with competitors', through a seven-point scale ("1 = we are far behind" to "7 = we have a very large advantage"). After EPCA, three of them formed one factor.

Control variables: The number of employees was used as a measure for firm size. However, in the structural equation modelling the natural logarithm was calculated and considered as a control variable. Further, a dummy variable was also used as a control variable to measure industrial sector in two main categories: 0 = services and other activities, and 1 = manufacturing activities.

4. Results

After performing EPCA, confirmatory factor analysis (CFA) was used to assess the fit of the hypothesised measurement model to the data. The procedure of treating ordinal variables with five or more categories as

continuous variables was followed as it does not impose practical impact on the results (Johnson & Creech, 1983). As the hypotheses for univariate and multivariate normal distribution of the data were rejected, we performed parameter estimation to assess the measurement model using Robust Maximum Likelihood (RML) method using LISREL 8.8 following a covariance-based approach (Jöreskog et al., 2001).

Standardised item-factor loadings retained with CFA are all greater than or equal to .600 (Hair et al., 2009) and the Average Variance Extracted (AVE) was calculated for all of the constructs in order to determine convergent validity (Fornell & Larcker, 1981). AVE values were above the .500 threshold in most cases with the exception of innovative practices, whose AVE value was .46. However, given the theoretical grounding of this factor and its relevance for the study, we decided not to exclude it from the model. In order to improve model fit and obtain acceptable values for standardised residuals, the items ORR2, ORR5, ITR2, ITR6, STM4 and ITC1 were dropped (see the Appendix). Table 1 shows the means, standard deviations, reliability coefficients, and correlations among the constructs after conducting CFA.

Table 1. Descriptive statistics and correlations among the variables/constructs

Construct/ variable	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12
1. Size (LnEmp)	4.389	1.263	-											
2. Sector	.780	-	-.255**	-										
3. Organisational Resources	4.773	1.133	.293**	-.141	.869									
4. IS/IT Resources	4.921	1.355	.343**	-.180*	.520**	.860								
5. Continuous Improvement	5.568	1.069	.228**	-.189*	.407**	.510**	.807							
6. Stakeholder Management	15.661	5.038	.083	-.220*	.389**	.340**	.313**	.804						
7. IS/IT Support to General Functional Activities	3.620	.868	.200*	-.054	.326**	.372**	.086	.228**	.867					
8. IS/IT Support to Environmental Management	3.543	.966	.028	-.092	.218*	.353**	.210*	.273**	.541**	.799				
9. Good Housekeeping Practices	3.752	.563	.042	-.062	.349**	.256**	.411**	.234**	.032	.063	.764			
1. Innovative Practices	3.043	.744	-.056	-.138	.391**	.288**	.248**	.300**	.171	.223*	.411**	.763		
11. Managerial Practices	2.871	.900	.230**	-.250**	.372**	.365**	.323**	.430**	.236**	.270**	.236**	.469**	.804	
12. Environmental Performance	4.341	1.116	.054	-.258**	.371**	.247**	.358**	.376**	.214*	.273**	.376**	.413**	.331**	.868

Correlations are obtained from summated scales. Scale reliabilities (Cronbach's alpha) are on the diagonal in boldface.
*p < .05; **p < .01.

Furthermore, we found that the squared root of respective AVE for each pair of latent variables were always larger than their shared correlation, which evidenced discriminant validity (Fornell & Larcker, 1981). The appendix contains the item loadings after conducting CFA as well as the AVE for each construct. Fit statistics for the measurement model were adequate ($\chi 2$ = 565.005, df = 482, p = .119, RMSEA = .024, NFI = .912, CFI = .993, IFI = .993).

The structural model was stablished taking organisational resources, IS/IT resources, size, and sector as the exogenous latent variables. Size and sector were control variables. Endogenous latent variables comprise continuous improvement, stakeholder management, IS/IT support to general functional activities, IS/IT support to environmental management, good housekeeping practices, innovative practices, managerial practices, and environmental performance.

Figure 2 shows the final results of the structural model, where the parameters for the relationships between the constructs are estimated. The hypothesised model provided an adequate fit to the data ($\chi 2$ = 646.859, df = 558, p = .005, RMSEA = .035, CFI = .984; IFI = .984). Fit indices are acceptable considering the number of observations per group and the number of observed variables. In particular, under these conditions, it is expected to find significant p-values for the Chi-square statistic even with good fit (Hair et al., 2009).
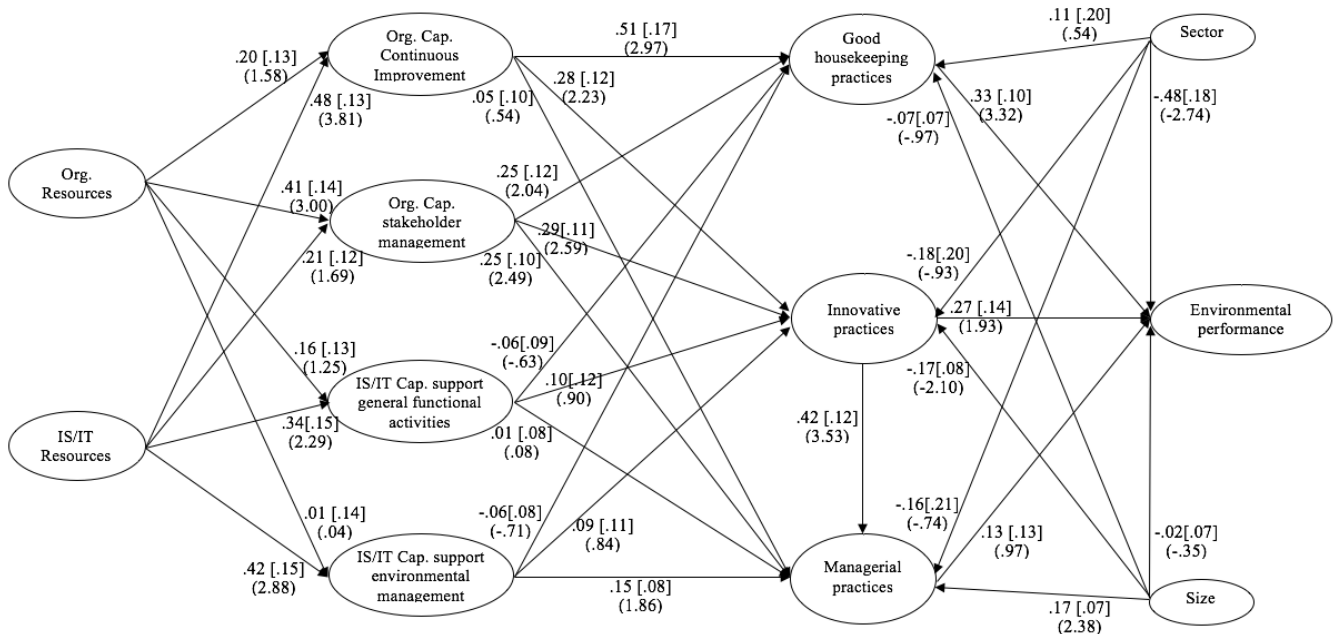
Fig.2. Final results of the structural model ($\chi 2$ = 646.859, df = 558, p = .005, RMSEA = .035, n=129). Numbers above are standardised path coefficients [standard errors of estimates], and t-values in parenthesis below

According to the results exhibited in figure 2, organisational resources influence only the development of a capability of stakeholder management given the statistically significant effect. Thus, hypothesis 1a is supported whereas hypotheses 1b and 1c are not supported. On the other hand, IS/IT Resources have positive and statistically significant effects on all of the firm capabilities. This provides full support to hypotheses 2a, 2b and 2c.

Regarding the influence of organisational capabilities for continuous improvement on environmental management practices, only hypotheses 3a and 3b are supported because such capabilities have a statistically significant effect on proactive environmental practices related to both good housekeeping and innovative practices. Yet, hypotheses 4a, 4b, and 4c are fully supported due to the positive and significant effect of organisational capabilities for stakeholder management on all three forms of proactive environmental practices. Furthermore, because of the

only statistically effect of IS/IT capabilities related to the support to environmental management on proactive environmental practices related to managerial practices, only hypothesis 5c is partially supported.

Hypothesis 6 is confirmed due the positive and statistically significant effect of proactive environmental practices related to innovative practices on managerial practices. Concerning the effect of proactive environmental practices on environmental performance, results provided support only to hypotheses 7a and 7b since that performance is influenced only by proactive environmental practices related to good housekeeping and innovative practices. Table 2 summarises the hypotheses test results of the structural model.

Finally, size has a positive and significant effect on proactive environmental practices related to managerial practices (β=.17; p<.05), whereas there is a negative and significant influence on innovative practices (β= -.17; p<.05). Industry sector only has a negative and significant effect on environmental performance (β= -.48; p<.01).

5. Discussion

Results evidenced the strategic role of organisational and IS/IT resources in paving the way to the development of both organisational and IS/IT capabilities. Yet, organisational and IS/IT capabilities are predominantly determined by the availability and use of IS/IT resources rather than organisational resources. In particular, organisational resources are an antecedent of the development of a capability for stakeholder management. That is, sampled firms use their quality control systems, technological and physical resources, and reputation to build trust-based collaborative relationships with stakeholders when dealing with environmental concerns. Despite these results are in line with findings of Chan (2005), we did not find evidence of the effect of organisational resources on continuous improvement and IS/IT capabilities, which partially supports the hypothesised influence of such resources. In this case, firms rely more on the availability, combination and use of IS/IT resources in terms of skills of IS/IT staff, modularity of applications, and technological infrastructure to develop organisational and IS/IT capabilities. Hence, IS/IT resources become a key strategic attribute that determine the development of capabilities as assert Ravinchandran and Lertwongsatien (2005), particularly related to improvement efforts, collaboration with stakeholders and deployment of the IS/IT-related capabilities as such.

Our findings evidence the role of organisational and IS/IT capabilities in boosting the adoption of proactive environmental practices in sampled firms. As the NRBV-related literature predicts (Hart, 1995; Hart & Dowell, 2011), there is an influence of the capability for continuous improvement on the development of proactive environmental practices at the level of good housekeeping practices and innovative practices (i.e., input substitution, product re-design, and process modification). This shows that continuous improvement is crucial for the adoption of the operational and engineering aspects of proactive environmental practices. That is, such capability in firms drives response through routinely actions in processes and operations that represent incremental changes towards environmental protection. At the same time, it paves the way to more radical changes related to product and process modification based on environmental grounds (Christmann, 2000).

A capability for stakeholder management in the studied firms is linked to the adoption of proactive environmental practices. That is, the importance and attention paid to primary stakeholders (Clarkson, 1995)–owners and shareholders, employees and suppliers–will determine corporate response to environmental concerns through initiatives at operational, technical and managerial levels. This is not surprising as previous literature argues for the importance that managers give to different stakeholder groups to the development of proactive environmental practices given the collaborative relationships that can be established to consider their preferences and garner resources (Aragón-Correa et al., 2008; Buysse & Verbeke, 2003; Caldera et al., 2018; Sharma & Vredenburg, 1998).

Table 2. Summary of hypothesis test results

Hypothesis	Path coefficient	t-value	Conclusion
H1a: Org. Resources -> Org. cap. for continuous improvement	.20	1.58	Rejected
H1b: Org. Resources -> Org. cap. for stakeholder management	.41	3.00**	Supported
H1c: Org. Resources -> IS/IT capablities			Rejected
Org. Resources -> IS/IT sup. to gen. functional activities	.16	1.25	
Org. Resources -> IS/IT sup. to environ. management	.01	.04	
H2a: IS/IT Resources -> Org. cap. for continuous improvement	.48	3.81***	Supported
H2b: IS/IT Resources -> Org. cap. for stakeholder management	.21	1.69†	Supported
H2c: IS/IT Resources -> IS/IT capablities			Supported
IS/IT Resources -> IS/IT sup. to gen. functional activities	.34	2.29*	
IS/IT Resources -> IS/IT sup. to environ. management	.42	2.88**	
H3a: Org. cap. for continuous improvement -> proact. environ practices: good housekeeping practices	.51	2.97**	Supported
H3b: Org. cap. for continuous improvement -> proact. environ practices: innovative practices	.28	2.23*	Supported
H3c: Org. cap. for continuous improvement -> proact. environ practices: managerial practices	.05	.54	
H4a: Org. cap. for stakeholder management -> proact. environ practices: good housekeeping practices	.25	2.04*	Supported
H4b: Org. cap. for stakeholder management -> proact. environ practices: innovative practices	.29	2.59**	Supported
H4c: Org. cap. for stakeholder management -> proact. environ practices: managerial practices	.25	2.49*	Supported
H5a: IS/IT capabilities -> proact. environ practices: good housekeeping practices			Rejected
IS/IT sup. to gen. functional activities -> good housekeeping practices	-.06	-.63	
IS/IT sup. to environ. management -> good housekeeping practices	-.06	-.71	
H5b: IS/IT capabilities -> proact. environ practices: innovative practices			Rejected
IS/IT sup. to gen. functional activities -> innovative practices	.10	.90	
IS/IT sup. to environ. management -> innovative practices	.09	.84	
H5c: IS/IT capabilities -> proact. environ practices: managerial practices			Partially supported
IS/IT sup. to gen. functional activities -> managerial practices	.01	.08	
IS/IT sup. to environ. management -> managerial practices	.15	1.86†	
H6: Proact. environ practices: innovative practices -> proact. environ practices: managerial practices	.42	3.53***	Supported
H7a: Proact. environ practices: good housekeeping practives -> Environmental performance	.33	3.32***	Supported
H7b: Proact. environ practices: innovative practives -> Environmental performance	.27	1.93†	Supported
H7c: Proact. environ practices: managerial practives -> Environmental performance	.13	.97	Rejected

†p < .1; *p < .05; **p < .01; ***p < .001.

Concerning the relationship between IS/IT capabilities and the adoption of proactive environmental practices, there is only evidence of influence of the capability for IS/IT support to environmental management activities on managerial practices. In this sense, results highlight that IS/IT capabilities enable a managerial aspect of environmental protection through capturing, storing, processing and visualising relevant data and information (Ghobakhloo et al., 2018), particularly related to regulations and norms, technical aspects and availability of clean

technologies. Through these characteristics, capabilities for IS/IT support to environmental management allow the firm to reconsider beliefs, actions, outcomes of operations and routines (Seidel et al., 2013), and redirect them towards the reduction of environmental impact related to prevention and control strategies (Benitez-Amado & Walczuch, 2012; De Camargo Fiorini et al., 2019; Hanelt et al., 2017).

When looking at both IS/IT resources and capabilities, the findings reveal that IS/IT resources become more critical than IS/IT capabilities when assuming a proactive stance towards environmental protection. In general, continuous improvement and stakeholder management are the main drivers of action in terms of environmental management practices. Notwithstanding, the capabilities approached in this study are mainly shaped by IS/IT resources suggesting thus an indirect effect of IS/IT resources on the adoption of proactive environmental practices. Interestingly, it is worth highlighting the relationship between IS/IT resources and innovative practices, mediated by the development of a continuous improvement capability. For this case, innovative practices, which have higher probability of leading to "complete offsets" (Popp, 2005), ultimately rely on IS/IT resources. The non-supported effects of IS/IT capabilities on proactive environmental practices in terms of good housekeeping and innovative practices may be due to the lack of awareness and knowledge by firms about "the substantial influence of [IS/IT] on the organisation's environmental footprint" and "…how [IS/IT] can be integrated into their environmental programs" (Jenkin et al., 2011, p. 302).

The positive effect of innovative practices on managerial practices found in this study reveals that firms that already achieved environmental innovations have enough capabilities to overcome management barriers (Amores-Salvadó et al., 2015; Ziegler & Seijas Nogareda, 2009). That is, firms acquire capabilities through the implementation of innovative practices towards environmental protection that allow them to adopt managerial practices such as environmental audits, handbooks of procedures and insurance plans against environmental risks. In other words, innovative approaches in the engineering side of proactive environmental practices (i.e., changes in products and processes) shapes the managerial dimension of those practices in firms.

The role of proactive environmental practices accounts for the relationship between resources and capabilities with environmental performance as previous studies found (Aragón-Correa et al., 2008; Chan, 2005; Leonidou et al., 2017; Russo & Fouts, 1997; Uwizeyemungu et al., 2018). Firms studied in this work exhibit a better environmental performance derived from innovative practices, which imply transformational changes in processes and business practices. Furthermore, an improved environmental performance is also a consequence of transformations in the operations system (González-Benito & González-Benito, 2005). We did not find evidence of the implication of the managerial aspects of proactive environmental practices on environmental performance. This is in line with previous studies that indicated that the adoption of managerial practices does not guarantee a contribution to a better environmental performance (Heras-Saizarbitoria et al., 2020) as they may constitute "a form of symbolic environmentalism" (Testa et al., 2018).

In regards to firm size as control variable, results show that smaller firms tend to adopt innovative practices. This may be explained by the flexibility, adaptability, orientation for innovativeness and shorter lines of communication as proper characteristics of small firms that allow environmental proactivity (Aragón-Correa et al., 2008; Boakye et al., 2020; Reyes-Rodríguez et al., 2016), which has been shown in the case of such firms in Colombia (DAMA-CINSET, 1996). However, findings indicate that smaller firms seem to be reluctant for the adoption of managerial practices because they do not perceive standards strategically, and they are specific-customised whereas standards are generic (Chasse & Boiral, 2016; Gesternfeld & Roberts, 2000). In other words, a formalisation does not allow small firms to adopt managerial practices. In the light of the validation of hypothesis 7, these particular findings show that the adoption of managerial practices has innovative practices as an antecedent, but at the same time require formalisation and standards, which is a characteristic of larger firms.

With respect to industry sector, results show that in the Colombian context, firms belonging to services and other activities exhibit a better environmental performance than manufacturing firms. This supports the conception of manufacturing firms–leather-tanning, non-ferrous metals, wood products, chemical substances, non-metallic products, food, iron and steel, paper and printing –as firms with high environmental significance (DAMA-CINSET, 1996; Sabogal Mogollón, 2005).

6. Conclusions, limitations and implications

The aim of this study was to deepen understand the relationship between both organisational and IS/IT resources and capabilities and proactive environmental practices. Our answer to the research question is that IS/IT resources are more critical than organisational resources in the development of both organisational and IS/IT capabilities. In turn, organisational capabilities such as continuous improvement and stakeholder management are key antecedents of the development of proactive environmental practices related to operational, innovative and managerial aspects whereas IS/IT capabilities adopt a supporting role, specifically towards the adoption of the managerial aspects of proactive environmental practices. The ultimate effect on an improved environmental performance is determined by the more tangible aspects of proactive environmental practices focused on products and processes rather than practices related to managerial aspects.

The paper contributes to the environmental management literature by examining an integration of both organisational and IS/IT resources and capabilities in paving the way to the adoption of proactive environmental practices and improve environmental performance. This constitutes an extension of the RBV framework in the realm of environmental management and confirms the endogenous nature of the greening of businesses. Further, the study contributes to the IS/IT literature by approaching IS/IT understood as resources and capabilities in the pursuit of transformations towards environmental sustainability. The results show that IS/IT does not work in isolation but contributes jointly with further organisational attributes to the fulfilment of organisational goals, in this case the implementation of proactive environmental practices and the improvement of environmental performance. Finally, our study contributes to the literature in environmental management by validating a model that explains environmental commitment in firms in a developing country setting. Despite firms in the sample have been actively participating in training and counselling schemes provided by the environmental authority, our results show that firms in such a particular setting have been able to develop strategic attributes by themselves that allow them to proactively respond to the demands for the protection of the natural environment.

Our research has limitations that must be acknowledged. First, the theoretical model did not explore the implications on competitive advantage so as to fully validate the RBV approach in the context of environmental management. Hence, it is important to explore dimensions of competitive advantage and their relationship with environmental performance and proactive environmental practices. Second, the adopted theoretical approach did not involve external factors that might also explain the adoption of proactive environmental practices. For this purpose, the consideration of contingency and institutional theories could be useful in the exploration of external drivers of proactive environmental practices as well as factors that might moderate the relationship between both organisational and IS/IT capabilities and proactive environmental practices. Third, in terms of methods, the limited sample size did not allow us to provide further analyses by comparing sub-models using industrial sectors as criteria. Finally, the cross-sectional nature of the research design imposed a limitation itself. Longitudinal data will certainly be useful for tracking the development over time of the studied resources and capabilities and the relationships with proactive environmental practices and environmental performance.

The implications for practitioners and policy makers suggests that Colombian firms not only may exhibit differentiated degrees of proactivity in their organisational responses to stakeholder pressures for improved environmental performance, but that they also may be aware of the importance of information management. There

is a call for the environmental authority in Bogotá to offer training programs and incentives about the importance of information management and their associate mechanisms and technologies. Consequently, resource use, materials and energy could be tracked, and environmental regulations could be monitored. It is necessary to highlight the support of IS/IT in the achievement of environmentally-friendly operations by undertaking substantial changes in products and processes counting with the perceptions and perspectives of different stakeholders.

References

Albertini, E. (2019). The Contribution of management control systems to environmental capabilities. *Journal of Business Ethics*, *159*(4), 1163–1180. https://doi.org/10.1007/s10551-018-3810-9

Amores-Salvadó, J., Martin-de Castro, G., & Navas-López, J. E. (2015). The importance of the complementarity between environmental management systems and environmental innovation capabilities: A firm level approach to environmental and business performance benefits. *Technological Forecasting and Social Change*, *96*, 288–297. https://doi.org/10.1016/j.techfore.2015.04.004

Aragón-Correa, J. A., Hurtado-Torres, N., Sharma, S., & García-Morales, V. J. (2008). Environmental strategy and performance in small firms: A resource-based perspective. *Journal of Environmental Management*, *86*(1), 88–103. https://doi.org/10.1016/j.jenvman.2006.11.022

Armstrong, J. S., & Overton, T. S. (1977). Estimating nonresponse bias in mail surveys. *Journal of Marketing Research*, *14*(3), 396. https://doi.org/10.2307/3150783

Arribas, I., Espinós-Vañó, M. D., García, F., & Oliver, J. (2019). Defining socially responsible companies according to retail investors' preferences. *Entrepreneurship and Sustainability Issues*, *7*(2), 1641–1653. https://doi.org/10.9770/jesi.2019.7.2(59)

Arribas, I., Espinós-Vañó, M. D., García, F., & Tamošiūnienė, R. (2019). Negative screening and sustainable portfolio diversification. *Entrepreneurship and Sustainability Issues*, *6*(4), 1566–1586. https://doi.org/10.9770/jesi.2019.6.4(2)

Arribas, I., Espinós-Vañó, M., García, F., & Morales-Bañuelos, P. (2019). The Inclusion of Socially Irresponsible Companies in Sustainable Stock Indices. *Sustainability*, *11*(7), 2047. https://doi.org/10.3390/su11072047

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99–120. https://doi.org/10.1177/014920639101700108

Benitez-Amado, J., & Walczuch, R. M. (2012). Information technology, the organizational capability of proactive corporate environmental strategy and firm performance: a resource-based analysis. *European Journal of Information Systems*, *21*(6), 664–679. https://doi.org/10.1057/ejis.2012.14

Betts, T. K., Super, J. F., & North, J. (2018). Exploring the influence of institutional pressures and production capability on the environmental practices - Environmental performance relationship in advanced and developing economies. *Journal of Cleaner Production*, *187*, 1082–1093. https://doi.org/10.1016/j.jclepro.2018.03.186

Bharadwaj, A. S. (2000). A resource-based perspective on information technology capability and firm performance: An empirical investigation. *MIS Quarterly*, *24*(1), 169. https://doi.org/10.2307/3250983

Bhatt, G. D., & Gover, V. (2005). Types of information technology capabilities and their role in competitive advantage: An empirical study. *Journal of Management Information Systems*, *22*(2), 253–277. https://doi.org/10.1080/07421222.2005.11045844

Boakye, D. J., TIngbani, I., Ahinful, G., Damoah, I., & Tauringana, V. (2020). Sustainable environmental practices and financial performance: Evidence from listed small and medium-sized enterprise in the United Kingdom. *Business Strategy and the Environment*, *December 2019*, 2583–2602. https://doi.org/10.1002/bse.2522

Borek, A., Helfert, M., Ge, M., & Parlikad, A. K. (2012). IS/IT Resources and Business Value: Operationalization of an Information Oriented Framework. In R. Zhang, J. Zhang, Z. Zhang, J. Filipe, & J. Cordeiro (Eds.), *Enterprise Information Systems* (pp. 420–434). Springer Berlin Heidelberg.

Buysse, K., & Verbeke, A. (2003). Proactive environmental strategies: a stakeholder management perspective. *Strategic Management Journal*, *24*(5), 453–470. https://doi.org/10.1002/smj.299

Byrd, T. A., & Turner, D. E. (2000). Measuring the flexibility of information technology infrastructure: Exploratory analysis of a construct. *Journal of Management Information Systems*, *17*(1), 167–208. https://doi.org/10.1080/07421222.2000.11045632

Caldera, H. T. S., Desha, C., & Dawes, L. (2018). Exploring the characteristics of sustainable business practice in small and medium-sized enterprises: Experiences from the Australian manufacturing industry. *Journal of Cleaner Production*, *177*, 338–349. https://doi.org/10.1016/j.jclepro.2017.12.265

Chan, R. Y. K. (2005). Does the natural-resource-based view of the firm apply in an emerging economy? A survey of foreign invested enterprises in China. *Journal of Management Studies*, *42*(3), 625–672. https://doi.org/10.1111/j.1467-6486.2005.00511.x

Chasse, S., & Boiral, O. (2016). Legitimizing corporate (Un)sustainability: A case study of passive SMEs. *Organization & Environment*, 1086026616672065. https://doi.org/10.1177/1086026616672065

Christmann, P. (2000). Effects of "best practices" of environmental management on cost advantage: The role of complementary assets. *Academy of Management Journal*, *43*(4), 663–680. https://doi.org/10.5465/1556360

Clarkson, M. B. E. (1995). A stakeholder framework for analyzing and evaluating corporate social performance. *Academy of Management Review*, *20*(1), 92. https://doi.org/10.2307/258888

Correa Ospina, M. L., & Díaz Pinzón, B. H. (2018). Capacidad en tecnologías de la información y desempeño organizacional: un estudio en el contexto colombiano. *Innovar*, *28*(69), 99–116. https://doi.org/10.15446/innovar.v28n69.71699

Couper, M. P. (2000). Web surveys: A review of issues and approaches. *Public Opinion Quarterly*, *64*(4), 464–494. https://doi.org/10.1086/318641

DAMA-CINSET. (1996). *Valoración del impacto ambiental de la pequeña y mediana industria en el Distrito Capital*. CINSET.

De Camargo Fiorini, P., Chiappetta Jabbour, C. J., Lopes de Sousa Jabbour, A. B., Oliveira Stefanelli, N., & Fernando, Y. (2019). Interplay between information systems and environmental management in ISO 14001-certified companies. *Management Decision*, *57*(8), MD-07-2018-0739. https://doi.org/10.1108/MD-07-2018-0739

Dragomir, V. D. (2020). Practical aspects of environmental strategy. In V. D. Dragomir (Ed.), *SpringerBriefs in applied sciences and technology* (pp. 33–73). Springer. https://doi.org/10.1007/978-3-030-29548-6_2

Etzion, D. (2007). Research on organizations and the natural environment, 1992-present: A review. *Journal of Management*, *33*(4), 637–664. https://doi.org/10.1177/0149206307302553

Eurostat. (2020). *Small and medium-sized enterprises (SMEs)*. https://ec.europa.eu/eurostat/web/structural-business-statistics/structural-business-statistics/sme

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 39. https://doi.org/10.2307/3151312

García, F., González-Bueno, J., Guijarro, F., & Oliver, J. (2020). Forecasting the Environmental, Social, and Governance Rating of Firms by Using Corporate Financial Performance Variables: A Rough Set Approach. *Sustainability*, *12*(8), 1–18. https://doi.org/10.3390/su12083324

García, González-Bueno, Oliver, & Riley. (2019). Selecting Socially Responsible Portfolios: A Fuzzy Multicriteria Approach. *Sustainability*, *11*(9), 2496. https://doi.org/10.3390/su11092496

Gesternfeld, A., & Roberts, H. (2000). Size matters: Barriers and prospects for environmental management in small and medium-sized enterprises. In R. Hillary (Ed.), *Small and Medium-Sized Enterprises and the Environment: Business imperatives* (pp. 106–118). Greenlaf.

Ghobakhloo, M., Azar, A., & Fathi, M. (2018). Lean-green manufacturing: the enabling role of information technology resource. *Kybernetes*, *47*(9), 1752–1777. https://doi.org/10.1108/K-09-2017-0343

González-Benito, J., & González-Benito, Ó. (2005). Environmental proactivity and business performance: an empirical analysis. *Omega*, *33*(1), 1–15. https://doi.org/10.1016/j.omega.2004.03.002

González-Bueno, J. A., & Nuñez Rodríguez, J. (2018). La inversión socialmente responsable: una mirada desde las agencias de rating social de VIGEO-EIRIS Y MSCI ESG STATS. *Finance, Markets and Valuation*, *4*(1), 39–55.

Gosling, S. D., Vazire, S., Srivastava, S., & John, O. P. (2004). Should we trust web-based studies? A comparative analysis of six preconceptions about internet questionnaires. *American Psychologist*, *59*(2), 93–104. https://doi.org/10.1037/0003-066X.59.2.93

Grant, R. M. (1991). The resource-based theory of competitive advantage: Implications for strategy formulation. *California Management Review*, *33*(3), 114–135. https://doi.org/10.2307/41166664

Hair, J. F., Black, W., Babin, B., & Anderson, R. (2009). *Multivariate data analysis* (7th ed.). Pearson.

Hanelt, A., Busse, S., & Kolbe, L. M. (2017). Driving business transformation toward sustainability: exploring the impact of supporting IS on the performance contribution of eco-innovations. *Information Systems Journal*, *27*(4), 463–502. https://doi.org/10.1111/isj.12130

Hart, S. L. (1995). A natural-resource-based view of the firm. *Academy of Management Review*, *20*(4), 986–1014. https://doi.org/10.5465/amr.1995.9512280033

Hart, S. L., & Dowell, G. (2011). Invited editorial: A natural-resource-based view of the firm. *Journal of Management*, *37*(5), 1464–1479. https://doi.org/10.1177/0149206310390219

Heras-Saizarbitoria, I., Boiral, O., García, M., & Allur, E. (2020). Environmental best practice and performance benchmarks among EMAS-certified organizations: An empirical study. *Environmental Impact Assessment Review*, *80*(May 2019), 106315. https://doi.org/10.1016/j.eiar.2019.106315

Jenkin, T. A., McShane, L., & Webster, J. (2011). Green information technologies and systems: Employees' perceptions of organizational practices. *Business & Society*, *50*(2), 266–314. https://doi.org/10.1177/0007650311398640

Johnson, D. R., & Creech, J. C. (1983). Ordinal measures in multiple indicator models: a simulation study of categorization error. *American Sociological Review*. https://doi.org/10.2307/2095231

Judge, W. Q., & Douglas, T. J. (1998). Performance implications of incorporating natural environmental issues into the strategic planning process: An empirical assessment. *Journal of Management Studies*, *35*(2), 241–262. https://doi.org/10.1111/1467-6486.00092

Jöreskog, K. G., Sörbom, D., & Du Toit, S. H. C. (2001). *LISREL 8: New statistical features*. Scientific Software International.

Karagozoglu, N., & Lindell, M. (2000). Environmental management: Testing the win-win model. *Journal of Environmental Planning and Management*, *43*(6), 817–829. https://doi.org/10.1080/09640560020001700

Leonidou, L. C., Christodoulides, P., Kyrgidou, L. P., & Palihawadana, D. (2017). Internal drivers and performance consequences of small firm green business strategy: The moderating role of external forces. *Journal of Business Ethics*, *140*(3), 585–606. https://doi.org/10.1007/s10551-015-2670-9

López-Gamero, M. D., Molina-Azorín, J. F., & Claver-Cortés, E. (2009). The whole relationship between environmental variables and firm performance: Competitive advantage and firm resources as mediator variables. *Journal of Environmental Management*, *90*(10),

3110–3121. https://doi.org/10.1016/j.jenvman.2009.05.007

Marhraoui, M. A., & El Manouar, A. (2020). Organizational Agility and the Complementary Enabling Role of IT and Human Resources: Proposition of a New Framework. In *Lecture Notes in Information Systems and Organisation* (pp. 55–65). https://doi.org/10.1007/978-3-030-34269-2_4

Mata, F. J., Fuerst, W. L., & Barney, J. B. (1995). Information technology and sustained competitive advantage: A resource-based analysis. *MIS Quarterly*, *19*(4), 487. https://doi.org/10.2307/249630

Melville, N. P. (2010). Information systems innovation for environmental sustainability. *MIS Quarterly*, *34*(1), 1. https://doi.org/10.2307/20721412

Mir, D. F., & Feitelson, E. (2007). Factors affecting environmental behavior in micro-enterprises. *International Small Business Journal: Researching Entrepreneurship*, *25*(4), 383–415. https://doi.org/10.1177/0266242607078583

Nemlioglu, I., & Mallick, S. K. (2017). Do Managerial Practices Matter in Innovation and Firm Performance Relations? New Evidence from the UK. *European Financial Management*, *23*(5), 1016–1061. https://doi.org/10.1111/eufm.12123

Nuhu, N. A. (2016). *The use and effectiveness of management control systems in the Australian public sector*. Macquarie University.

Pang, M.-S., Lee, G., & DeLone, W. H. (2014). IT Resources, Organizational Capabilities, and Value Creation in Public-Sector Organizations: A Public-Value Management Perspective. *Journal of Information Technology*, *29*(3), 187–205. https://doi.org/10.1057/jit.2014.2

Parker, C. M., Redmond, J., & Simpson, M. (2009). A review of interventions to encourage SMEs to make environmental improvements. *Environment and Planning C: Government and Policy*, *27*(2), 279–301. https://doi.org/10.1068/c0859b

Popp, D. (2005). Uncertain R&D and the Porter hypothesis. *Contributions in Economic Analysis & Policy*, *4*(1). https://doi.org/10.2202/1538-0645.1423

Prieto-Sandoval, V., Jaca, C., Santos, J., Baumgartner, R. J., & Ormazabal, M. (2019). Key strategies, resources, and capabilities for implementing circular economy in industrial small and medium enterprises. *Corporate Social Responsibility and Environmental Management*, *26*(6), 1473–1484. https://doi.org/10.1002/csr.1761

Ravinchandran, T., & Lertwongsatien, C. (2005). Effect of information systems resources and capabilities on firm performance: A resource-based perspective. *Journal of Management Information Systems*, *21*(4), 237–276. https://doi.org/10.1080/07421222.2005.11045820

Ray, Muhanna, & Barney. (2005). Information technology and the performance of the customer service process: A resource-based analysis. *MIS Quarterly*, *29*(4), 625. https://doi.org/10.2307/25148703

Rehfeld, K.-M., Rennings, K., & Ziegler, A. (2007). Integrated product policy and environmental product innovations: An empirical analysis. *Ecological Economics*, *61*(1), 91–100. https://doi.org/10.1016/j.ecolecon.2006.02.003

Reyes-Rodríguez, J. F., Ulhøi, J. P., & Madsen, H. (2016). Corporate Environmental Sustainability in Danish SMEs: A Longitudinal Study of Motivators, Initiatives, and Strategic Effects. *Corporate Social Responsibility and Environmental Management*, *23*(4), 193–212. https://doi.org/10.1002/csr.1359

Ridwandono, D., & Subriadi, A. P. (2019). IT and Organizational Agility: A Critical Literature Review. *Procedia Computer Science*, *161*, 151–159. https://doi.org/10.1016/j.procs.2019.11.110

Rueda-Barrios, G., Gonzalez-Bueno, J., Rodenes Adam, M., & Moncaleano Rodríguez, G. (2018). La cultura organizacional y su influencia en los resultados de innovación en las pequeñas y medianas empresas. *Espacios*, *39*(42), 36.

Russo, M. V, & Fouts, P. A. (1997). A resource-based perspective on corporate environmental performance and profitability. *Academy of Management Journal*, *40*(3), 534–559. https://doi.org/10.5465/257052

Sabogal Mogollón, J. H. (2005). *Variables que determinan la inversión ambiental en la pequeña y mediana empresa (PyME) de Bogotá: caso AERCAR*. Uniandes.

Salem, M. A., Shawtari, F. A., Shamsudin, M. F., & Hussain, H. I. (2016). The relation between stakeholders' integration and environmental competitiveness. *Social Responsibility Journal*, *12*(4), 755–769. https://doi.org/10.1108/SRJ-12-2015-0189

Sax, L. J., Gilmartin, S. K., & Bryant, A. N. (2003). Assessing response rates and nonresponse bias in web and paper surveys. *Research in Higher Education*, *44*(4), 409–432. https://doi.org/10.1023/A:1024232915870

Seidel, S., Recker, J., & vom Brocke, J. (2013). Sensemaking and sustainable practicing: functional affordances of information systems in green transformations. *MIS Quarterly*, *37*(4), 1275–1299. https://doi.org/10.25300/MISQ/2013/37.4.13

Sharma, S., & Vredenburg, H. (1998). Proactive corporate environmental strategy and the development of competitively valuable organizational capabilities. *Strategic Management Journal*, *19*(8), 729–753. https://doi.org/10.1002/(SICI)1097-0266(199808)19:8<729::AID-SMJ967>3.0.CO;2-4

Testa, F., Iraldo, F., & Daddi, T. (2018). The effectiveness of EMAS as a management tool: A key role for the internalization of environmental practices. *Organization and Environment*, *31*(1), 48–69. https://doi.org/10.1177/1086026616687609

Torugsa, N. A., O'Donohue, W., & Hecker, R. (2012). Capabilities, proactive CSR and financial performance in SMEs: Empirical evidence from an Australian manufacturing industry sector. *Journal of Business Ethics*, *109*(4), 483–500. https://doi.org/10.1007/s10551-011-1141-1

Uwizeyemungu, S., Raymond, L., Poba-Nzaou, P., & St-Pierre, J. (2018). The complementarity of IT and HRM capabilities for competitive performance: a configurational analysis of manufacturing and industrial service SMEs. *Enterprise Information Systems*, *12*(10), 1336–1358. https://doi.org/10.1080/17517575.2018.1448118

van de Wetering, R. (2019). IT Infrastructure Capability and Health Information Exchange: The Moderating Role of Electronic Medical Records' Reach. In W. Abramowicz & A. Paschke (Eds.), *Business Information Systems Workshops* (pp. 397–407). Springer

International Publishing.

Vickers, I., & Cordey-Hayes, M. (1999). Cleaner production and organizational learning. *Technology Analysis & Strategic Management*, *11*(1), 75–94. https://doi.org/10.1080/095373299107591

Vishwakarma, A. K., Nema, A. K., & Sangle, S. (2019). What determines environmental proactiveness in the Indian cement sector? An empirical study. *Journal of Cleaner Production*, *234*, 961–971. https://doi.org/10.1016/j.jclepro.2019.06.291

Wade, & Hulland. (2004). The resource-based view and information systems research: Review, extension, and suggestions for future research. *MIS Quarterly*, *28*(1), 107. https://doi.org/10.2307/25148626

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, *5*(2), 171–180. https://doi.org/10.1002/smj.4250050207

Yousif, M., Magnusson, J., & Pessi, K. (2017). IT Agility: Current State, Organizational Contingencies, and Future Research Avenues. *Proceedings of the 50th Hawaii International Conference on System Sciences (2017)*, 5205–5213. https://doi.org/10.24251/hicss.2017.631

Ziegler, A., & Seijas Nogareda, J. (2009). Environmental management systems and technological environmental innovations: Exploring the causal relationship. *Research Policy*, *38*(5), 885–893. https://doi.org/10.1016/j.respol.2009.01.020

Juan Felipe REYES-RODRIGUEZ holds a PhD in Management from Aarhus University, Denmark. He is associate professor at the department of Business Administration at Universidad Pontificia Bolivariana, Campus Bucaramanga, Colombia. His current research interests include corporate sustainability with a particular focus on SMEs, entrepreneurship and sustainable entrepreneurship as well as IS/IT in organisations. His research output has been published in journals such as Corporate Social Responsibility and Environmental Management, and Journal of Global Strategic Management, among others.
ORCID ID: https://orcid.org/0000-0001-6815-0388

Jairo GONZÁLEZ-BUENO received the B.S. degree in financial engineering from the Universidad Autónoma de Bucaramanga, Colombia, in 2004, the M.S. degree in business administration from Universidad Industrial de Santander, Colombia, in 2012, and the Ph.D. in business management and administration from Universitat Politècnica de València, Spain, in 2018. He is currently an associate professor of finance at the faculty of business administration, Universidad Pontificia Bolivariana, Colombia. His current research interests include portfolio management, finance ethics and valuation. His research has been published in Journal of Business Economics and Management; Sustainability; and Journal Finance, Markets and Valuation, among others. He is a member of the Editorial Board of the Journal Economics. Ecology. Socium; and Finance, Markets and Valuation.
ORCID ID: https://orcid.org/0000-0002-5896-094X

Gladys RUEDA-BARRIOS received the B.S. degree in business administration from the Universidad Autónoma de Bucaramanga, Colombia, in 2000, and the PhD in integration of Information Technologies in organisations from Universidad Politècnica de València, Spain, in 2012. She is currently an associate professor in organisational studies at the faculty of business administration, Universidad Pontificia Bolivariana, Colombia, as well as associate researcher at the Ministry of Science and Technology of Colombia. Her current research interests include organisational culture, IT in organisations, and entrepreneurship.
ORCID ID: https://orcid.org/0000-0002-8344-2722

Appendix. Construct operationalisation

Construct/items	Item code	Loading
Organisational resources (AVE=.627)		
Physical resources (e.g. plant, equipment and materials)	ORR1	.725
Human resources (e. g., well trained and engaged staff)	ORR2	-
Organisational resources (e.g. having well-established quality control systems and cash management systems)	ORR3	.815
Technological resources (e.g. unique technologies to produce quality products)	ORR4	.817
Systems and information technologies	ORR5	-
Reputation of the firm	ORR6	.807
IS/IT resources (AVE=.553)		
The technology infrastructure needed to electronically link our firm with external business partners (i.e., key customers, suppliers, alliances) is present and in place today.	ITR1	.756
The capacity of our network infrastructure and connection speed adequately meets our current operative business needs.	ITR2	-
Our application systems are very modular; that is, business units are supported by a module and/or application to carry out operations	ITR3	.763
Corporate data is currently sharable across business units and organisational boundaries	ITR4	.716
Our IS staff has the ability to quickly learn and apply new technologies as they become available.	ITR5	.771
IT projects are jointly developed by both the IS department and business units	ITR6	-
We have established long term partnerships with IT vendors and service providers to respond to our IT needs in a timely and effective manner	ITR7	.712
Continuous improvement (AVE=.597)		
We generate feasible and low cost solutions to our environmental problems	COI1	.666
We have carried out activities that are no required by the regulator	COI2	.818
We can assess the environmental impact of our activities in order to identify needs and opportunities for improvement	COI3	.824
Stakeholder management (AVE=.577)		
Suppliers	STM1	.738
Stockholders/owners	STM2	.713
Employees	STM3	.823
Customers	STM4	-
IS/IT support to general functional activities (AVE=.628)		
Providing necessary information to customers	ITC1	-
Determining customer requirements (i.e., products, preference, pricing, and quantity)	ITC2	.755
Reengineering business processes	ITC3	.891
Integrating the firm with its suppliers	ITC4	.783
Increasing the speed of logistic activities	ITC5	.731
IS/IT support to environmental management (AVE=.679)		
Assessing the environmental impact of our firm's activities	ITC6	.901
Gathering information required for environmental management (e.g., regulations and norms, technical aspects and availability of clean technologies)	ITC7	.739
Good Housekeeping Practices (AVE=.517)		
All the water taps are always perfectly closed when they are not in use	PEP1	.716
Avoid wasting the chemical products that we use in the production plant	PEP2	.699
Implement warehouse best practices	PEP3	.742

Innovative Practices (AVE=.460)

Modify product design to reduce environmental impact	PEP4	.649
Replace polluting raw materials by less polluting materials	PEP5	.730
Change production processes to improve environmental performance	PEP6	.659
Evaluate or select our suppliers including environmental requirements as criteria	PEP7	.673

Managerial Practices (AVE=.583)

Carry out environmental audits	PEP8	.684
Have in place an insurance plan against environmental risks and incidents	PEP9	.814
Have in place a handbook of procedures including precise instructions about environmental operations in the production plant	PEP10	.786

Environmental Performance (.700)

Reduction of energy consumption	ENP1	.758
Become pioneers in carrying out environmental improvement actions	ENP2	.836
Pollution prevention at the source	ENP3	.909

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

ENTREPRENEURSHIP AND SUSTAINABILITY CENTER

Publisher

http://jssidoi.org/esc/home

enterprise europe network

Business Support on Your Doorstep

CASPA

Scopus

Web of Science

Clarivate Analytics

THE INSTIGATION OF HATRED: QUESTIONS OF LEGAL EVALUATION AND PROCEDURAL ISSUES

Dovilė Murauskienė ¹, Raimundas Jurka ², Jolanta Zajančkauskienė ³

1, 2, 3 Law School of Mykolas Romeris University, Ateities Str. 20, LT-08308, Vilnius, Lithuania

E-mails: ¹dovile.murauskiene@mruni.eu; ²rjurka@mruni.eu; ³zajan@mruni.eu

Abstract. Considering the infringements upon the principle of equality caused by hate crimes, as well as the negative impact of such crimes not only on their victims but also on other persons within the same group of vulnerable people, the authors of this paper analyse hate speech as a criminally punishable act. The analysis of this issue is of essential importance as hate speech manifests on the internet, often via comments made online, a worrying issue as hate speech is therefore often tolerated. This article raises the question of the delimitation of hate speech from hate crime; the authors present an analytical overview of national and international case law, providing an insight into the process of distinguishing hate speech from a person's right to exercise their freedom of self-expression. A separate section covers the challenges that law enforcement authorities face when investigating incidents of hate speech online, where criminal activities often trespass the borders of a single state and their investigation requires tools of international cooperation to receive or transfer electronic evidence.

1. Introduction

Criminal acts motivated by hate violate, in particular, the principle of equality of persons, which is considered a fundamental constitutional value. This type of crime and the reasons behind it (homophobia, xenophobia, racism, discrimination, etc.) are greatly divisive in society. Historically, the groups that are the target of hatred have most often already been subjected to some form of discrimination (for instance according to their race, skin colour, religion, sexuality, etc.). Therefore, the protection of their rights and the delivery of justice are vital in preventing divisions and hostility between different groups in society, which can escalate into active discrimination or even physical violence (European Union Agency for Fundamental Rights, 2012). Criminal acts of this type are often referred to as 'a message for action'. The victims of such criminal acts and other people associated with the same

groups receive a 'clear message' that they are undesirable and not welcome in the society, and therefore feel unsafe. Thus, such acts cause not only the primary victimisation of the victim, but also the indirect victimisation of individuals belonging to the same groups.

For this reason, democratic countries unanimously agree that, firstly, there must be clear criteria for identifying such criminal acts and, secondly, clear law enforcement practices must be developed in line with international standards, according to which perpetrators must be held legally liable for hatred-motivated acts that breach the law. Thirdly, clear criteria must be established in case law to distinguish between hate crimes and the exercise of freedom (right) of expression. This requires scientific foundations, with clarity in the definitions of such criteria.

Finally, hate speech, as a form of hate-motivated crime, is most often committed online, and often extends beyond the borders of a single state. Therefore, law enforcement authorities face the challenge of collecting data (evidence) relevant to the investigation of a criminal offence; they make use of legal aid mechanisms based on the principles of international cooperation.

Considering the fact that instigations of hatred are mainly committed on the internet, alongside commercial web pages, the question of the negative and positive responsibility of specific businesses and commercial companies must be raised. This is a far-reaching issue, as on 10 June 2009 the Estonian Supreme Court (*Vjatsheslav Leedo v. AS Delfi*) emphasized the responsibility of the Delfi Estonia internet portal for tolerating such comments. The Court also stated that if e-comments are full of slander, vulgar, humiliating, or threatening, then the administrator must take all possible actions to remove them. In this case, the European Court of Human Rights (ECtHR) was also mindful, in this context, of the importance of the wishes of internet users not to disclose their identity in exercising their freedom of expression. At the same time, the spread of the internet and the possibility—or for some purposes the danger—that, once made public, information will remain public and circulate forever, calls for caution. The ease of disclosure and substantial volume of information on the internet means that it is a difficult task to detect defamatory statements and remove them. This is true for an internet news portal operator, as in the present case, but this is an even more onerous task for a potentially wronged person, who would be less likely to possess the resources required for the continual monitoring of the internet. The Court considered the latter element an important factor in balancing the rights and interests at stake. A number of other elements were also relevant, in particular: the insulting and threatening nature of the comments, the fact that the comments were posted in reaction to an article published by the applicant company in its professionally-managed news portal run on a commercial basis; the insufficiency of the measures taken by the applicant company to avoid damage being caused to other parties' reputations and to ensure a realistic possibility that the authors of the comments will be held liable; and the moderate sanction imposed on the applicant company. Based on these elements, the Court considered that, in the present case, the domestic courts' finding that the applicant company was liable for the defamatory comments posted by readers on its internet news portal was a justified and proportionate restriction on the applicant company's right to freedom of expression. There has, accordingly, been no violation of Article 10 of the European Convention for the Protection of Human Rights and Fundamental Freedoms (hereinafter – the Convention, ECHR; *DELFI AS v. Estonia*, 2013).

Incidentally, by way of example, in 2017 the Parliament of the Federal Republic of Germany also made the step of enacting the law to fight the instigation of hatred on social media. According to this law, social media companies must remove any comments that instigate hatred within a period of 24 hours. The sanctions for being passive in this regard can reach up to €20 million. This country should be seen as the pioneer in providing financial sanctions for social media companies (Normantaitė, 2017).

Despite these considerations clearly demonstrating the relevance of hate-motivated crimes, Lithuanian legal theory has studied the matter only sporadically. A somewhat more detailed analysis of related aspects is presented in a number of papers by V. Čigrin (2013), I. Balsiūnaitė (2016), or I. Isokaitė (2015). The most recent papers in

this area are the guidelines drawn up by D. Murauskienė (2019) on the application of criminal responsibility for hate speech and hate crimes, or the methodological aid for in-service training produced by Ž. Navickienė and K. Miliūnė (2020). Issues of the social and legal assessment of hate crimes and hate speech have been addressed in a number of publications by non-governmental organizations (e.g., Bitiukova, 2013; Normantaitė, 2017, etc.).

With respect to the issue of procedural evidence that arises in investigating hate speech acts online, specifically regarding obtaining or transferring evidence in cross-border cases, a number of papers by Lithuanian scholars are of note, for instance the publications of Jurka (2019) and Jurka and Zajančkauskienė (2016). The issue has been examined to a much greater extent in papers by foreign scholars (Stefan & González Fuster, 2018; Smuha, 2018; Tinoco-Pastrana, 2020; and others).

Incitement to hatred [authors' note: the terms *incitement to hatred* and *hate speech* are used synonymously in the present paper], the consequences thereof, the severity of the criminal acts, and the scarcity of studies in this area prompted the authors to address the most important issues related to both legal evaluation and procedural evidence-related matters (objective). These issues include: the concept of hate speech; the criteria for the delineation of hate speech from hate crimes and exercising the freedom of self-expression; and the legal procedures for obtaining and transferring e-evidence to other states for the purpose of cross-border investigations of incitements to hatred online (tasks). For the purpose of the present paper, issues of hate crimes are analysed only to the extent necessary to define and interpret the concept of incitement to hatred.

A number of empirical data collection methods, such as analysis of research papers and legal instruments (the decisions and rulings of national and international courts), were used for the purpose of drawing up the present paper. This paper analyses select decisions of various national and international courts – critical cases that best illustrate the issues raised in the study. The selected data was processed using the most common theoretical research methods, such as systemic analysis, induction, and comparative analysis.

2. The concept of hate speech and its distinction from hate crimes

Hate is a general term for motivated crime that includes both hate crimes and hate speech (Murauskienė, 2019). Initially, Recommendation No. R (97) 20 of the Committee of Ministers of the Council of Europe to Member States on 'hate speech', adopted on 30 October 1997, introduced the term *hate speech*. It was defined as covering all forms of expression which spread, incite, promote, or justify racial hatred, xenophobia, anti-Semitism, or other forms of hatred based on intolerance (Council of Europe, 1997).

Hate speech also includes intolerance expressed by aggressive nationalism and ethnocentrism, or by discrimination and hostility against minorities, migrants, and people of immigrant origin (Council of Europe, 1997).

The term *hate crime* was used for the first time in Europe at the 2003 meeting of the Council of Ministers in Maastricht, hosted by the Organization for Security and Cooperation in Europe (OSCE). The meeting laid the foundations for the development of the concept of hate crimes, including all forms of racist, xenophobic violence and anti-Semitism (Organization for Security and Co-operation in Europe, 2003).

For a long time, Lithuania's approach was that *hate crimes* is a general term that also includes hate speech. It could be assumed that this approach was, to a certain extent, shaped by the definition of hate crime presented in the Recommendation of the Prosecutor General of the Republic of Lithuania 'On the organization, management and conduct of pre-trial investigations into criminal offences committed on racial, nationalist, xenophobic, homophobic or other discriminatory grounds' (hereinafter – Recommendations of the Prosecutor General, 2009). According to the Recommendations,

all criminal acts committed against persons, society, property, if they are motivated by negative, preconceived or stereotyped negative attitudes of the offender (culprit) regarding the racial, ethnic, national origin, religion, gender, sexual orientation of a particular individual or group of people, age, social status, disability, beliefs or views, generally fall into the specific category of criminal offences – hate crimes (para. 14).

Hate crimes (criminal acts) – are not only incitement against individuals or groups of individuals that are associated with a specific group as defined in criminal legislation, or individuals or groups of individuals reasonably or unreasonably associated with such groups, incitement of hatred, contempt or other humiliation against them, mental or physical violence against them, but also crimes against the property of such groups of people or their members, manifested in vandalism, various attacks against the centres of a certain group of people (community), houses of prayer, etc. (para.15).

Apparently, according to the Recommendation of the Prosecutor General, hate speech is considered to be one of these types of hate crimes.

This approach was not entirely consistent with the attempts of the international community and certain scholars to make a distinction between the two criminal acts. For example, the OSCE Office for Democratic Institutions and Human Rights (hereinafter – ODIHR) takes the position that the incitement of hate is not included in the definition of hate crimes. According to the ODIHR, a hate crime consists of two key elements: (i) contrary-to-law actions; and (ii) a motive for hatred. Since, apart from the motive of hate, the incitement to crime consists of a language element only which, by itself, is not recognised to constitute a criminal act, incidents of this kind are not recognised as hate crimes. On the other hand, the Organisation claims that inciting physical violence or threatening people because of their racial, ethnic, or other affiliation is still a hate crime (OSCE OHDIR, 2009). Indirectly, this opinion was endorsed by the International Association of Prosecutors (IAP). In its recommendations, the IAP claimed that prosecutors needed to understand the distinction between the two different types of criminal acts – hate crimes and hate speech. The IAP holds that even in countries in which hate crimes are not criminalised, attributing hate speech to hate crimes must be avoided due to the different level of dangerousness and nature of the two categories of acts (International Association of Prosecutors, 2014).

Representatives of the European Commission have expressed the position that hate crimes and hate speech are not identical acts, and therefore the protection of victims of each act has its peculiarities (European Commission, 2019).

The most recent research publications also take the view that the relationship between hate crime and hate speech cannot be viewed as a relationship between the whole and its part. On the contrary, these are two different categories of criminal acts for a number of reasons. Firstly, in cases of hate crimes a motive of hate is only one element in the composition of the act, whose presence or absence does not eliminate the dangerousness of the criminal act itself. Therefore, the practical activity of law enforcement institutions normally does not address the issue of whether a specific hate crime is dangerous (i.e. complies with the *ultima ratio* principle). In the case of hate speech, the hate of the offender and their prejudiced views are an essential component in applying criminal responsibility, because in the absence of the motive of hate a speech in itself is not a criminal act; quite the contrary, it is a value enshrined in the Constitution. Secondly, in the case of hate speech, when addressing the issue of criminal responsibility law enforcement officials normally face the issue of striking the right balance between two fundamental principles, i.e. equality and freedom of expression. Attempts to balance the two principles have led to the building of a concept of the gravity of a criminal act; this concept guides law enforcers in deciding whether the incitement to hatred has gone beyond the limits of the freedom of self-expression to the extent of justifying the imposition of strictest liability. The same circumstance also accounts for the third difference between the two criminal acts – the peculiarity of providing evidence. In the case of a hate crime, the

primary task is to prove the key criminal act, while hatred is referred to only as a subjective attribute. Meanwhile, in the case of hate speech, the primary task is to prove that the perpetrator's prejudice, bias, or hatred has gone beyond the limits of freedom of expression. This is a subjective attribute, however, that raises a number of challenges in practical application (Murauskienė, 2019).

On 30 March 2020, the aforementioned Recommendations of the Prosecutor General were replaced by a new version of the recommendations 'The Methodological Recommendations for Peculiarities of Organisation And Management of Pre-Trial Investigation of Hate Crimes and Crimes Related to Hate Speech'. The new recommendations reflect the positions that have been expressed by the international community and advocated for in more recent research papers. The new version of the recommendations takes the approach that all criminal acts committed against a person, society, or property, to the extent that they are motivated by the negative, prejudiced, or stereotyped stance of the offender (culprit), or stereotypes regarding the racial, ethnic, or national origin or citizenship of a particular individual or group of people, their religion, sex, sexual orientation, age, social status, disability, beliefs, or views, are to be divided into hate crimes and criminal offences (hereinafter – hate crimes), or hate speech (Prosecutor General's Office of the Republic of Lithuania, 2020).

In conclusion, hate crimes and hate speech are two different categories of criminal acts, and the principal criteria for demarcation between the two are the peculiarities of the attributes, the peculiarities of proving that a criminal act has been committed, and the peculiarities of proving the presence of hate as a motive – a subjective element. In the case of hate crimes, a motive for hatred is a subjective attribute, failing proof of which the criminal act is nevertheless considered grave and criminally punishable; besides, the motive of hate in this case can be incriminated as a circumstance aggravating the offender's responsibility. In the case of hate speech, unless the motivation of hate is established, speech as such is not considered to constitute a crime in the legal sense, and can be considered only to represent an inappropriate, incorrect, or unethical exercise of freedom of expression that does not incur the most severe, i.e. criminal, responsibility. Lastly, the two actions are different both in terms of their definition and, respectively, their legal regulation.

Hate crime constitutes all criminal offences motivated by hatred, bias, and/or prejudice against a group of persons distinguished by the attributes of age, sex, sexual orientation, disability, race, nationality, language, origin, social status, religion, belief, or opinions (Prosecutor General's Office of the Republic of Lithuania, 2020).

In Lithuania, the legal regulation of hatred-motivated crimes is based on the Framework Decision 2008/913/JHA on combating certain forms and expressions of racism and xenophobia by means of criminal law passed in 2008 by the European Council (hereinafter – Framework Decision; Murauskienė, 2019). Lithuania transposed the provisions of the Framework Decision on the criminalisation of hatred crimes in three ways by defining: the individual criminal acts; the motive of hate as an attribute qualifying the act; and hate as a circumstance aggravating responsibility.

Hate speech is the public dissemination (verbally, in writing or otherwise) of information (ideas, opinions, known misrepresentations) that mocks, despises, hates, incites to discriminate, or provokes to exercise physical violence against a group of people or a person belonging to the group on the grounds of gender, sexual orientation, race, nationality, language, descent, social status, religion, belief, or opinion (Prosecutor General's Office of the Republic of Lithuania, 2020).

Characteristically, such acts are committed using linguistic means, i.e. verbally or in writing by expressing certain statements or words using different symbols (signs and other objects) of an inflammatory or discriminatory nature (Prosecutor General's Office of the Republic of Lithuania, 2020). The definition uses the phrase 'in any expression', suggesting that the means are not necessarily words, but could also be video recordings, or any other

action or content – for example, a computer game showing people of a specific nationality being killed, or a meeting convened against a certain sexuality, etc. In Lithuania, the most common form of disseminating hate speech is by writing comments in the public space (for instance, comments on social media, such as Facebook, Instagram, etc.).

Hate speech is associated with incitement to hatred in the sense that it provokes hostility against certain people. The incitement of hatred against specific national, ethnic, or religious groups of people, or persons of a specific race, is normally manifested by the humiliation of personal dignity. For that purpose, misleading fabrications are often disseminated that include distorted or biased data about race, the history of an ethnic group or nation, their culture, traditions, psychological structure, faith, ideas, events, monuments, and documents that constitute national or religious values. These fabrications can pollute and offend an ethnic or denominational group or some of its members by distributing data concealing mockery, disgust, or contempt towards such individuals. This kind of information adversely affects not only a certain group of persons, but also the wider society with a prevailing atmosphere of insecurity; it triggers a desire to defend one's interests against allegedly strange and dangerous immigrants (Balsiūnaitė, 2016).

The responsibility for any actions inciting hatred is provided in Chapter XXV of the Criminal Code (hereafter – CC): 'Crimes and misdemeanours against a person's equal right and freedom of conscience'. The objects of the relevant Chapter of the CC are the rights and equality of groups of individuals and their members, irrespective of their gender, sexual orientation, race, nationality, descent, social status, religion, convictions, or views. In other words, the protection of the objects of such criminal acts allows the person to belong to a certain minority or another vulnerable societal group, and freely act in the society without being afraid of the adverse consequences potentially arising as a result. Additional objects are the security of the society, human life, health, and dignity.

Article 170(1) of the CC provides for criminal responsibility for a person who, seeking to disseminate, has produced, acquired, sent, transported, or retained items that mocked, despised, hated, or incited to discriminate against a group of people or a person belonging to it on the grounds of age, gender, sexual orientation, disability, race, nationality, language, beliefs, or views, or which incites violence or the violent physical treatment of such a group of people or a person belonging to it, or was proliferating such items. Para. 2 of the Article has, in practice, been applied much more often, and provides for criminal responsibility to a person who publicly incites violence or the physical violent treatment of a group of persons or a person belonging thereto on the grounds of sex, sexual orientation, race, nationality, language, descent, social status, religion, convictions, or views. Thus, the intended act can be manifested in one or several alternative actions: (a) ridiculing a particular group or a person belonging to it; (b) stigmatising them; (c) inciting hatred against them; and (d) inciting discrimination against them.

The ECtHR has ruled regarding the criminalisation of such verbal assaults by stating that incitement to hatred does not necessarily require incitement to commit a certain violent or other such criminal act. Attempts to insult, ridicule, or slander certain sections or groups of the population are sufficient for public authorities to prioritise the fight against racist statements in respect of irresponsible freedom of expression, which violates the dignity and even security of these sections or groups (*Feret v. Belgium*, 2009; *Cumpana and Mazare v. Romania*, 2004).

Article 170(3) of the CC provides for the criminal responsibility of a person who was publicly inciting violence or calling for the violent treatment of a group of people or a person belonging to such a group because of their age, sex, sexual orientation, disability, race, nationality, descent, social status, beliefs, religion, or views, or who financed or otherwise supported such an activity. Incitement to violence or physical violent treatment involves a direct or indirect encouragement to use physical or mental violence (kill, injure, etc.; Judgment of Vilnius Regional Court of 24 May 2016 in Criminal Case No. 1A-35-209-2016).

When qualifying acts according to Article 170 (2 and 3) of the CC, *publicity* as a method of committing the act is a mandatory attribute of a criminal activity (Judgment of the Supreme Court of Lithuania of 1 March 2018 in Criminal Case No. 2K-91-976/2018). On the other hand, the attribute of publicity in the context of such acts is a narrower concept than in the case of a violation of public order, in which case a public place is considered to be any place that can be accessed by other persons. In the case of the actions being analysed, it is necessary to establish that any of the public discriminatory or insulting statements or invitations to violence of the offender were intended to directly affect specific readers or listeners – i.e. to incite them against a group of persons or a person belonging to the group on the basis of sex, sexual orientation, race, nationality, language, descent, social status, religion, belief, or views – and to provoke hatred, to seek to build contemptuous and discriminatory opinions, or to encourage the use of physical or mental violence against such a demographic.

According to Article 170^2 (1) of the CC, criminal responsibility is provided to a person who publicly condones, denies, or grossly trivialises the crimes of genocide, war crimes, or other crimes against humanity recognised under the legal acts of the Republic of Lithuania or the European Union, or the caselaw of the courts of the Republic of Lithuania or international courts, where this is accomplished in a manner which is threatening, abusive, insulting, or which disturbs the public order. Additionally, criminal responsibility is provided to a person who publicly condones, denies, or grossly trivialises: the aggression perpetrated by the USSR or Nazi Germany against the Republic of Lithuania; the crimes of genocide, war crimes, or other crimes against humanity committed by the USSR or Nazi Germany in the territory of the Republic of Lithuania or against the inhabitants of the Republic of Lithuania; other grave or serious crimes committed during 1990–1991 against the Republic of Lithuania by the persons perpetrating or participating in the perpetration of aggression against the Republic of Lithuania; or grave crimes against the inhabitants of the Republic of Lithuania, where this is accomplished in a manner which is threatening, abusive, insulting, or which disturbs the public order.

The case law of the Supreme Court noted that according to Article 170^2 of the CC, criminal responsibility is applied not only for denial or gross belittling of the crimes referred to in the disposition, but also for denying or grossly trivialising the aggression of the USSR and Nazi Germany against the Republic of Lithuania, or the endorsement of such facts (Judgment of the Supreme Court of Lithuania of 22 January 2013 in Criminal Case No. 2K-7-102/2013).

Regarding the criminalisation of such actions, the ECtHR has held that a 'remark directed against the Convention's underlying values' is removed from the protection of Article 10 by Article 17 of the ECHR (*Perinçek v. Switzerland*, 2015). Such a case may be related to the denial or justification of international crimes (*Garaudy v. France*, 2003; *Witzsch v. Germany* [No. 2], 2005). However, Article 17 is, as recently confirmed by the ECtHR, only applicable on an exceptional basis and in extreme cases when it is (directly) clear from the outset that the right to freedom of expression was used for purposes contrary to the values of the Convention (*Perinçek v. Switzerland*, 2015).

Denying, tolerating, or trivialising genocide, war crimes, or crimes against humanity is one of the types of incitement of hatred. Denial of the holocaust is a specific racial category of self-expression, consisting of two key aspects: (i) denial or minimisation of crimes against humanity; and (ii) incitement of hatred against the Jewish community. Furthermore, denial of clearly established historical facts such as those of the Holocaust may not be considered to constitute historical research seeking historical truth. The actual object in this case was to rehabilitate the Nazi regime and accuse the victims of falsifying history. Disputing the existence of crimes against humanity was, therefore, one of the most severe forms of racial defamation and of incitement of hatred towards Jews (*Garaudy v. France*, 2003).

The introduction of such attributes in the disposition of the Articles of the Special Part of the CC providing for criminal responsibility for hate speech, as well as collision between the principle of equality and the right to self-

expression when assessing the content and the gravity of the statements, make the legal assessment of hate crimes in judicial practice quite a challenge. Crimes of hate speech are committed by trespassing the limits of the freedom of self-expression, therefore it is extremely difficult to determine at which point a person is still properly exercising their right and where it turns into hate speech that is dangerous from the viewpoint of criminal law. In this context, it is essential to properly define the criteria for distinguishing freedom of expression from hate speech crimes, i.e. to determine the point at which freedom of expression ends and the equality of persons begins. Therefore, the following section of the paper will provide an analysis of the key trends in national and international case law on the exercise of the separation of freedom of expression from speech inciting hatred.

3. Hate speech and the right to self-expression

Hate speech, as a form of violation of the right to equality, is directly linked to trespassing the limits of freedom of expression. In a general sense, in both national and international legislation freedom of expression is defined as the right to freely express one's opinions, thoughts, and beliefs, and to freely collect, receive, and communicate such information and ideas. Exercising freedom of expression also presumes an obligation to avoid, as far as possible, expressions that are gratuitously offensive to others and thus are an infringement on their rights (*Gündüz v. Turkey*, 2003).

According to the Constitution of the Republic of Lithuania, the freedom to express one's beliefs and disseminate information also means that the legislator must put in place legal regulation such that any incitement to national, racial, or social hatred, violence, discrimination, slander, or disinformation seeking to attempt to substantially deny relevant constitutional values be prosecuted as a criminal offence, and be held legally liable as a criminal act (Ruling of the Constitutional Court of the Republic of Lithuania of 8 July 2005).

According to the ECHR, everyone has the right to freedom of expression. This right shall include the freedom to hold opinions and to receive and impart information and ideas without interference by public authority, regardless of frontiers (Article 10). The judgments of the ECtHR highlight that this freedom applies not only to 'information' and 'freedoms' that that are accepted favourably, but also to those that are insulting, shocking, or disturbing. On the other hand, the freedom of expression is not absolute, and the trespassing of its limits that is related to the incitement of hatred may and has to be punishable according to criminal law. When assessing the legality of restriction of the freedom of expression, the ECtHR considers the following three criteria: (i) whether the restriction is prescribed by law; (II) whether the restriction has been put in place seeking a legitimate objective; and (III) whether the restriction is necessary in a democratic society. The ECtHR interprets the restrictions in a narrow sense of the word, while the law is interpreted broadly (Macovei, 2004).

The application of criminal responsibility for incitement to hatred is consistent with the permissible restrictions on the freedom of expression because: (i) it is prescribed in criminal law; (ii) it has the legitimate aim of protecting vulnerable groups against incitement to hatred, and is put in place with a view to defending the values enshrined in the Convention such as tolerance, social peace, etc. (*Norwood v. The United Kingdom*, 2004); and iii) the case law has established clear criteria for assessing whether a restriction on freedom of expression is necessary in a particular case. In national case law, these criteria are assessed from the perspective of the concept of the gravity of a criminal act *(*Judgment of the Supreme Court of Lithuania of 1 March 2016 in Criminal Case No. 2K-86-648/2016). The gravity of a criminal offence of hate speech makes it possible to pursue a reasonable application of criminal law measures without exceeding the guidelines put in place according to the *ultima ratio* doctrine, according to which criminal responsibility must apply only in the cases of the most severe and grave violations of the law. Those criteria are discussed below.

The context. One of the most important aspects considered by the courts is the social, historic, political, and other context in which hate speech was made. The ECtHR has held that the more tense the background, the more

dangerous the hate speech, making the application of the strictest liability justifiable (*Perinçek v. Switzerland*, 2015). For instance, when hate speech crimes are committed by certain individuals of radical views, on occasions of celebrations important for marginal groups, or by posting online comments about certain events that are specifically important for the society, it is highly likely that the requirements for language legitimacy have been violated.

The importance of the context has been also emphasised in Lithuanian case law. For example, by exonerating an accused individual who was inciting hatred against the LGBT community via their comments on a news portal, the Supreme Court of Lithuania held that 'the overall social background and the overall context of the commentary considered in the Case are not that tense that would justify any more stringent restrictions upon the exercise of the freedom of expression, and the application of criminal liability as an ultima ratio measure' *(*Judgment of the Supreme Court of Lithuania of 1 March 2016 in Criminal Case No. 2K-86-648/2016).

The statement dissemination method. The method of disseminating statements can significantly increase, or on the contrary mitigate, their gravity. The ECHR has previously held that, in light of its accessibility and its capacity to store and communicate vast amounts of information, the internet plays an important role in enhancing the public's access to news and facilitating the dissemination of information in general. The anonymity of internet users can facilitate the free flow of ideas and information. At the same time, the ease, scope, and speed of the dissemination of information on the internet, and the persistence of the information once disclosed, may considerably aggravate the effects of unlawful speech on the internet compared with traditional media (*DELFI AS v. Estonia*, 2013).

Following the case law of the ECtHR, Lithuanian courts adopted a very clear rule, according to which trespassing the limits of freedom of expression using the internet or other means of dissemination shall in all cases be considered more dangerous due to the scale and persistent nature (survival) of the information thus disseminated (Judgement of the Vilnius Regional court of 24 March 2016 in Criminal Case No. 1A-335-209-2016).

For instance, 'The ease, scope, and speed of the dissemination of information on the internet, and the persistence of the information once disclosed, may considerably aggravate the effects of unlawful speech on the internet compared to traditional media. Dissemination of such information on the internet increases the gravity of such acts' (Judgment of Vilnius Regional Court of 24 May 2016 in Criminal Case No. 1A-335-209-2016). 'Furthermore, any commentaries inciting violence or hatred on the internet, the posting of which may be promoted by the anonymity of the internet users, and which due to the peculiarity of the internet can be read by a huge number of people, are considered dangerous and criminally punishable, and in particular when such commentaries are posted in relation to articles on the most popular websites (one of those is www.15min.lt)' (Ruling of the Supreme Court of Lithuania of 1 March 2016 in the Criminal Case No. 2K-86-648/2016).

Personality of the author of the statements. In each case, when considering the limits and restrictions on freedom of expression, in addition to the context and content of the speech the ECtHR assesses the personality of the author (whether they are popular, well known, a politician, a blogger, etc.)

While freedom of expression is important for everybody, it is especially so for an elected representative of the people: they represent the electorate and defend their interests. However, the Court has previously reiterated that it is crucial for politicians, when expressing themselves in public, to avoid comments that might foster intolerance. The impact of racist and xenophobic discourse has been magnified in an electoral context, in which arguments naturally become more forceful (*Feret v. Belgium*, 2009).

It should be noted that in this respect the case law of Lithuania does not fully correlate with the position of the ECtHR. In one case, when responding to the arguments of a convict that they should not be prosecuted under Article 170 (1) of the CC for proclamations opposing joining the European Union, NATO, and the euro zone, the

Court of Appeals stated that, had they been a politician, their responsibility would have been smaller: 'This objection to Lithuania's integration into the EU, NATO, and the introduction of the euro would still be understandable if Ž.R. were a member of a political party, participated in elections to the Seimas or municipal councils, and in a politically correct form expressed criticism of the current situation in Lithuania' (Judgment of 26 February 2018 of the Klaipėda Regional Court in Criminal Case No. 1-11-361/2018). It may be concluded that, in the judgements of national courts, politicians can enjoy broader limits to their self-expression, which does not fully match the case law of the ECtHR (e.g., see *Feret v. Belgium*, 2009).

As has been mentioned earlier regarding the peculiarities of the case law in Lithuania in applying criminal responsibility for incitement to hatred, the main criterion referred to by the courts is the severity of the act. This criterion covers the other sub-criteria already formulated in the case law of the ECtHR. Furthermore, apart from the criteria referred to earlier, the courts identify other criteria defining the gravity of an act, such as the systematic nature of exceeding the limits of freedom of expression and the probability of actual consequences of such acts.

When providing reasoning for the latter consideration, in most cases the courts limit themselves to stating an actual threat to protected values, without specifying the indications. For instance:

> When recognising or refusing to recognise whether certain public statements constitute incitement against any nation, or a national, racial, ethnic, religious or another group of people, it is necessary to establish the validity of the threat they may pose to the values protected by criminal law. This presupposes that a conclusion statement of an offensive, derogatory nature is not sufficient to give rise to criminal responsibility under Article 170 (2) of the CC. To become criminally punishable, the statements must contain a specific direct or indirect incitement to hatred or discrimination, which could cause direct actual threat to the object protected by criminal law. The evidence in the present case allowed a conclusion that these circumstances were established, and the judicial decisions provided sufficient arguments that the actions of V.L. were not occasional or random, but V.L. was acting systematically by publishing extensive texts and making public comments, fully understanding the danger of their actions and seeking to provoke a negative public attitude towards Jewish people, homosexuals, and conservative and liberal parties, and was mocking and despising them (Judgment of 13 March 2018 of the Supreme Court of Lithuania in Criminal Case No. 2K-91-976/2018).

An analysis of the case law of national courts allows for the conclusion that the intensity of illegal actions, which is often manifested by the number of comments posted, the duration of the illegal actions, and their intensity show not only the danger of a specific person's actions, but also the purposefulness of their intent:

> It should be noted that the severity of V.Ž.'s actions is further exacerbated by the consistent and persistent nature of their actions (they were convicted for posting 13 entries online), the extended duration of such activity (the posts published in the period from 30 July 2012 until 12 February 2014), making purposeful statements against the community of believers, and seeking to mock and despise them (Judgment of 8 July 2016 of Klaipėda Regional Court in Criminal Case No. 1A-209-361/2016).

> Besides, there was only one short and rather unethical statement in the public online space in respect of which the subjective features of the act, i.e. a direct specific intent of the acquitted person to incite internet users reading their comments against homosexuals, to promote hatred or discrimination against them. (Ruling of 10 January 2019 of the Kaunas Regional Court in Criminal Case 1A-131-579/2019).

> The courts have provided extensive arguments regarding the intent of R.P., in its Ruling the Court of Appeals, specifically drawing attention to certain introductions that the convict was using when signing their commentaries, such as 'to Russian suckers', 'Russian Fascists' that clearly demonstrate their desire to publicly mock, despise, discriminate, call to violence, etc. Furthermore, as was mentioned earlier, R.P. had

written as many as 15 commentaries online, which proves that their actions were not random or accidental, but were rather premeditated and deliberate (Judgment of 3 October 2017 of the Supreme Court of Lithuania in Criminal Case No. 2K-206-693/2017).

In the long term, a rule was established in Lithuanian case law according to which one isolated comment on the internet exceeding the limits of the freedom of expression should not be subject to the most stringent form of liability (Judgment of 10 January 2019 of Kaunas Regional Court in Criminal Case No. 1A-131-579/2019).

This rule was partially rebutted by the judgment of the ECtHR in *Beizaras and Levickas v. Lithuania* at the beginning of 2020, which was extremely significant for Lithuania, in which the Court concluded that Lithuania had breached as many as three Articles of the Convention (13, 14, and 35). The case concerned a situation where two homosexual men posted a picture of them kissing to their Facebook page, and received countless negative comments including those calling for physical violence against them. The pre-trial investigation authorities, as well as the courts hearing the appeals, concluded, among other arguments, that in order for a person to be prosecuted under Article 170 of the CC, their actions must be of a systematic nature. Having assessed the whole situation and the arguments presented by the national courts, the ECtHR concluded that even a single hateful comment by the Appellant on the Facebook page, especially containing calls to 'kill' homosexuals, should be taken seriously. This is even further confirmed by the fact that the picture immediately 'went viral', and received more than 800 comments. The Court held, *inter alia*, that the case concerned open calls and encouragement to attack the physical and mental integrity of the appellants (in this respect see Decision of 7 May 2019 in *Panayotova and others v. Bulgaria*, paras. 58 and 59, with other references), against which only efficient criminal-law mechanisms can ensure adequate protection (see para. 111 of the Decision). This protection is provided in Article 170 of the CC and must be enforced in such cases.

Relatively little time has elapsed since the ECtHR passed the judgment, so no significant changes in case law have yet been observed. However, there is no doubt that this judgment and the motives presented in it will correct one of the characteristics of hate speech that has been so far relied upon, i.e. its systematicity.

4. Proving online hate speech by means of electronic evidence: key legal instruments for receiving (transmitting) it in cross-border cases

The report of the European Commission against Racism and Intolerance on Lithuania indicated that 'In Lithuania, hatred is often incited in cyberspace through online comments, blogs, social networks, and other fora' (European Commission against Racism and Intolerance, 2016). Therefore, investigations into hate crimes often require rapid access to electronic data in order to be able to initiate criminal prosecution and/or identify offenders.

Online services can be provided from any country in the world. Furthermore, the information (data) 'that users generate by means of new ICTs is, however, typically under the control of private companies which are often established in another jurisdiction and/or store data outside the investigating country' (Robinson, 2018). Therefore, when investigating criminal acts regarding incitement to hatred in cyberspace, national law enforcement institutions increasingly encounter cross-border situations, where electronic data (evidence) must be received from/transferred to other EU Member States or third countries.

In Lithuania, in order to initiate a pre-trial investigation and/or identify the suspected offender any investigation into incitement of hatred in cyberspace often requires the identification of the data regarding the subscriber (Navickienė & Miliūnė, 2020). The data on the subscriber is, in most cases, required in cross-border cases throughout the EU (Sippel & Melo, 2019).

When electronic data (evidence) or electronic service providers are located in another country, the parties can rely upon a number of pre-existing legal cooperation mechanisms for the transmission and recognition of evidence. The EU-wide instruments regulating this area are the mutual recognition mechanisms, now based upon the European Investigation Order Directive; mutual legal assistance (MLA) mechanisms (Proposal for a Regulation of the European Parliament and of the Council on European Production and Preservation Orders for electronic evidence in criminal matters COM/2018/225 final – 2018/0108 (COD)) are used in relation to third countries (hereafter – the Commission's proposal).

Although there are only a few EU legal instruments in the field of the transfer and recognition of evidence, the European Investigation Order (hereafter – EIO) is currently considered to be the most widely used instrument, optimally bringing closer the idea of the unimpeded recognition before a national court of any evidence collected abroad and transferred to another state (Jurka, 2019).

Directive 2014/41/EU of the European Parliament and of the Council of 3 April 2014 regarding the European Investigation Order in criminal matters (hereinafter – the EIO Directive) was adopted, seeking to develop a system of mutual recognition of investigative measures designed to collect all evidence, including electronic. For the purpose of enforcement of the investigative measure, the EIO Directive provides for different rules according to the type of electronic evidence. Firstly, regarding the data and the IP addresses of the subscriber (point e of Article 10(2), Article 11(1) of the EIO Directive). Secondly, regarding the previous flow data (*ex tunc*), depending on whether or not the historical traffic data was assessed in the Member State as coercive. In case the data is assessed as non-coercive, the same rules as those regarding the data subscriber can be applied. In opposite cases, i.e. where investigative measures are considered coercive, the general EIO procedures apply. Thirdly, regarding the data collected in real time, continuously, and over a certain period time (Article 28 of the EIO Directive). Fourthly, regarding the interception of telecommunications (Articles 30 and 31 of the EIO Directive). The EIO Directive also provides for the storage of electronic evidence, i.e. it puts in place provisional measures: 'The issuing authority may issue an EIO in order to take any measure with a view to provisionally preventing the destruction, transformation, removal, transfer, or disposal of an item that may be used as evidence' (Article 32(1) (Sippel & Melo, 2019).

Another important legal instrument is the Convention on Cybercrime of the Council of Europe (2001; hereinafter – the Budapest Convention). Cooperation according to the EIO Directive and the Budapest Convention in the area of electronic crime and electronic data (evidence) represents the so-called minimum level (Sipper & Melo, 2019). The most important provisions of the Budapest Convention in relation to the collection or transfer of electronic evidence are those on production order (Article 18), mutual assistance regarding provisional measures (Articles 29–30), and mutual assistance regarding investigations (Articles 31–34). The Budapest Convention requires parties to establish evidence provision orders for the receipt of computer data from service providers located in their territory, and subscriber data from service providers offering services in their territory. The proposal from the Commission also provides for an evidence storage order that is issued in cases when it is reasonably believed that computer data is subject to serious risk of loss or amendment.

In summary, it may be concluded that both the EIO Directive and the Budapest Convention have established a convenient system to obtain electronic evidence (Tosza, 2020; Maillart, 2019). However, not all states have joined the legal cooperation instruments discussed above, and therefore certain service providers do not fall within their scope. The EU has taken a number of legal initiatives to address the issue of obtaining and storing electronic evidence held, whether locally or by service providers established in another jurisdiction. On 17 April 2018, the European Commission published two proposals: 1) Proposal for a Regulation of the European Parliament and of the Council on European Production and Preservation Orders for electronic evidence in criminal matters COM/2018/225 final – 2018/0108 (COD) (European Commission, 2018b); and 2) Proposal for a Directive of the

European Parliament and the Council laying down harmonised rules on the appointment of legal representatives for the purpose of gathering evidence in criminal proceedings COM/2018/226 final – 2018/0107 (COD) (European Commission, 2018a).

The Explanatory Memorandum of the Commission's proposal for a Regulation of the European Parliament and of the Council on European Production and Preservation Orders for electronic evidence in criminal matters indicates that 'by introducing European Production Orders and European Preservation Orders, the proposal makes it easier to secure and gather electronic evidence for criminal proceedings stored or held by service providers in another jurisdiction'. The new instrument will not replace the EIO for obtaining electronic evidence but provides an additional tool for authorities. There may be situations, for example when several investigative measures need to be carried out in the executing Member State, where the EIO may be the preferred choice for public authorities. Creating a new instrument for electronic evidence is a better alternative than amending the EIO Directive because of the specific challenges inherent in obtaining electronic evidence, which do not affect the other investigative measures covered by the EIO Directive (European Commission, 2018b).

The following types of service providers fall under the scope of the Regulation: providers of electronic communications services; providers of information society services for which the storage of data is a defining component of the service provided to the user, including social networks to the extent that they do not qualify as electronic communications services; online marketplaces facilitating transactions between their users (such as consumers or businesses) and other hosting service providers; and providers of internet domain name and numbering services. The scope of the Regulation covers providers of electronic communications services as defined in the Directive establishing the European Electronic Communications Code. Traditional telecommunication services, consumers, and businesses increasingly rely on new internet-based services enabling inter-personal communications such as Voice over IP, instant messaging, and e-mail services, instead of traditional communications services. Therefore, the draft Regulation should apply to the following services in connection with the social networks, for example, Twitter, Facebook, and Instagram; instant messaging service providers facilitating content exchange, such as WhatsApp, FB Messenger, Telegram, Viber, and Skype (Jurka, 2019).

Both types of orders will only be able to be used in criminal proceedings starting with a pre-trial investigation and ending with a court decision or other ruling. The Commission Proposal envisages that both Orders can only be used in criminal proceedings from the initial pre-trial investigative phase until the closure of the proceedings by judgment or other decision. The Orders to produce subscriber and access data can be issued for any criminal offence, whilst the Order for producing transactional or content data may only be issued for criminal offences punishable in the issuing State by a custodial sentence of a maximum of at least three years, or for specific crimes which are referred to in the proposal and where there is a specific link to electronic tools and offences covered by Directive (EU) 2017/541 of the European Parliament and of the Council of 15 March 2017 on combating terrorism and replacing Council Framework Decision 2002/475/JHA and amending Council Decision 2005/671/JHA.

In summary, it may be concluded that the two legislative initiatives create, in essence, the principle of direct communication arising from the principle of mutual recognition applied in EU criminal jurisdiction. Different from the cases covered by EIO, the judicial institution issuing European Production Orders and European Preservation Orders will transfer the orders and the accompanying certificates directly to service providers or their designated legal representatives, and not to the competent law enforcement authority of the other Member State where the service provider is established. The measures are designed and put in place in order to facilitate international cooperation processes in criminal cases (Jurka, 2019).

In summarising the legal perspective on the transfer of electronic evidence in cross-border cases, it should be noted, however, that it still causes discussions both regarding the future application and regarding legal compliance with the principles of law (Stefan & González Fuster, 2018; Smuha, 2018; Jurka, 2019; Tinoco-Pastrana, 2020). In particular, this is because

'this approach effectively leads to the privatisation of mutual trust in Europe's area of criminal justice, which raises the second concern regarding the protection of fundamental rights. The Commission's proposal on e-evidence marks a fundamental shift in the scheme of co-operation in EU criminal matters, from a system of co-operation and communication between public (and mainly judicial) authorities, to a system of co-operation and communication between public authorities in the issuing state and private companies. The proposed system places undue responsibility on private providers to safeguard fundamental rights. Private providers do not enjoy equality with public authorities in terms of co-operation; this is evident by the very fact that they are subject to sanctions if they infringe their obligations under the Regulation' (Mitsilegas, 2018).

Conclusions

Criminal acts motivated by hatred are divided into hate crimes and hate speech that are manifested as information disseminated in any form (oral, written, action, etc.) targeting the most vulnerable groups in society; promoting hatred, discrimination, or bias against them; inciting ridicule, contempt, or discrimination; or exercising violence against such persons.

Hate crimes and hate speech are two different categories of criminal act, and the principal criteria for demarcation between the two are the peculiarities of their attributes and the peculiarities of proving the criminal act, which relates to proving the presence of the motive of hate as a subjective feature. In the case of hate crimes, the motive of hate is a subjective attribute, absent proof of which a criminal act is nevertheless considered grave and criminally punishable; besides, the motive of hate can in this case be incriminated as a circumstance aggravating the offender's liability. In the case of hate speech, unless the motive of hate is established the act is not considered to constitute a crime in the legal sense of the word, and can be considered to represent only an inappropriate, incorrect, or unethical exercise of freedom of expression that does not incur the most severe, i.e. criminal, responsibility.

When dealing with cases related to hate-speech, in seeking criminal responsibility for incitement to hatred courts face the problem of demarcating hate speech from a person's right to exercise their freedom of expression. When assessing whether a specific action that could have been undertaken to incite hatred should be criminally prosecuted, national and international courts take into account a number of aspects, such as the overall environment in which the information was spread, the author of the statements, the information dissemination method, the intensity (systemic nature) of the actions being considered, the resulting consequences, or the theoretical probability of such consequences appearing.

In Lithuania, most acts of hate incitement are committed online. Therefore, law enforcement authorities often need to receive or transfer electronic data (evidence) to or from other countries. Despite some practical challenges related to their implementation, the existing instruments for judicial cooperation under the EIO Directive and the Budapest Convention are considered highly functional platforms. However, not all states have joined these legal cooperation instruments, and therefore certain service providers do not fall within their scope of application. The proposal for Regulation on European Production Orders and European Preservation Orders can be considered an appropriate solution to this problem, despite concerns regarding the required innovations in the interaction between the public (law enforcement and judicial authorities) and the private sector according to the regulatory proposals.

References

Balsiūnaitė, I. (2016). Neapykantos kalbos raiška Lietuvos interneto dienraščių publikacijose apie pabėgelius [The usage of hate speech in Lithuanian online newspapers publications about refugees]. *Žurnalistikos tyrimai*, *11*, 78–102. https://doi.org/10.15388/zt/jr.2016.11.10751

Bitiukova, N. (Ed.). (2013). *Neapykantos kurstymas Lietuvoje. Dažniausiai užduodami klausimai* [Hate instigation in Lithuania: Frequently asked questions]. Vilnius: Human Rights Monitoring Institute. Retrieved from https://hrmi.lt/wp-content/uploads/2016/08/Neapykantos-kurstymas-Lietuvoje-DUK.pdf

Čigrin, V. (2013). Neapykantos nusikaltimai: aktualijos ir tendencijos [The hate crimes: current issues and tendencies]. *Public Security and Public Order*, (9), 73–91. Retrieved from https://www.mruni.eu/kpf_dokumentai/fakultetas/Leidiniai/MRU_VSVT_(9)_2013-06-20.pdf

Convention on Cybercrime of the Council of Europe. *European Treaty Series*, No. 185, 23 October 2001. Retrieved from https://www.coe.int/en/web/conventions/full-list/-/conventions/treaty/185

Council of Europe. (1997). *Recommendation No. R (97) 20 of the Committee of Ministers to Member States on "Hate Speech" (Adopted by the Committee of Ministers on 30 October 1997 at the 607th meeting of the Ministers' Deputies)*. Retrieved from https://search.coe.int/cm/Pages/result_details.aspx?ObjectID=0900001680505d5b

Decision on admissibility of 24 June 2003, *Garaudy v. France*, Application No. 65831/01, ECtHR.

Decision on admissibility of 13 December 2005, *Witzsch v. Germany* (No. 2), Application No. 7485/03, ECtHR

Decision of 16 November 2004, *Norwood v. The United Kingdom*, Application No. 23131/03, ECLI:CE:ECHR:2004:1116DEC002313103.

Directive 2014/41/EU of the European Parliament and of the Council of 3 April 2014 regarding the European Investigation Order in criminal matters. *OJ*, L 130, 1.5.2014, 1–36.

Directive (EU) 2017/541 of the European Parliament and of the Council of 15 March 2017 on combating terrorism and replacing Council Framework Decision 2002/475/JHA and amending Council Decision 2005/671/JHA. *OJ*, L 88, 6–21.

European Commission. (2018a). Proposal for a Directive of the European Parliament and of the Council laying down harmonised rules on the appointment of legal representatives for the purpose of gathering evidence in criminal proceedings COM/2018/226 final – 2018/0107 (COD). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A226%3AFIN

European Commission. (2018b). Proposal for a Regulation of the European Parliament and of the Council on European Production and Preservation Orders for electronic evidence in criminal matters COM/2018/225 final – 2018/0108 (COD). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A225%3AFIN

European Commission. (18 March 2019). European Commission High Level Group on combating racism, xenophobia and other forms of intolerance [News report]. Retrieved from https://ec.europa.eu/newsroom/just/item-detail.cfm?item_id=51025

European Commission against Racism and Intolerance. (2016). *ECRI report on Lithuania (fifth monitoring cycle)*. Retrieved from https://rm.coe.int/fifth-report-on-lithuania/16808b587b

European Convention for the Protection of Human Rights and Fundamental Freedoms, as amended by Protocols No. 11 and 14, supplemented by Protocols No. 1, 4, 6, 7, 12, 13 and 16. Retrieved from https://www.echr.coe.int/Pages/home.aspx?p=basictexts

European Union Agency for Fundamental Rights. (2012). *Making hate crimes visible in the European Union: Acknowledging victims' rights* [Report]. Luxembourg: Publications Office of the European Union. Retrieved from https://fra.europa.eu/sites/default/files/fra-2012_hate-crime.pdf

International Association of Prosecutors. (2014). *Prosecuting hate crimes. A practical guide*. Warsaw: OSCE Office for Democratic Institutions and Human Rights (ODIHR). Retrieved from https://www.osce.org/odihr/prosecutorsguide

Isokaitė, I. (2015). Ekonominio nuosmukio poveikis neapykantos veikų tendencijoms [Impact of the economic downturn on hate crime tendencies]. *Teisė*, *94*, 189–203. https://doi.org/10.15388/Teise.2015.94.7357

Judgment of 15 October 2015, *Perinçek v. Switzerland*, Application No. 27510/08, ECLI:CE:ECHR:2015:1015JUD002751008.

Judgment of 4 December 2003, *Gündüz v. Turkey*, Application No. 35071/97, ECLI: CE: ECHR:2003:1204JUD003507197.

Judgment of 16 July 2009, *Feret v. Belgium*, Application No. 15615/07, ECLI: CE: ECHR:2009:0716JUD001561507.

Judgement of 17 December 2004, *Cumpana and Mazare v. Romania*, Application No. 33348/96, ECLI: CE: E CHR:2004:1217JUD003334896.

Judgment of 10 October 2013, *DELFI AS v. Estonia*, Application No. 64569/09, ECLI: CE: ECHR:2013:1010JUD006456909.

Judgment of 14 January 2020, *Beizaras ir Levickas v. Lithuania*, Application No. 41288/15, ECLI: CE:ECHR:2020:0114JUD004128815.

Judgment of the Supreme Court of Lithuania of 22 January 2013 in Criminal Case No. 2K-7-102/2013.

Judgment of the Supreme Court of Lithuania of 1 March 2016 in Criminal Case No. 2K-86-648/2016.

Judgment of the Supreme Court of Lithuania of 1 March 2018 in Criminal Case No. 2K-91-976/2018.

Judgment of Vilnius Regional Court of 24 May 2016 in Criminal Case No. 1A-335-209-2016.

Jurka, R. (2019). Įrodymų perdavimo Europos Sąjungos valstybių narių baudžiamojoje justicijoje iššūkiai ir atradimai [Challenges and innovations of evidence transferring in European Union Member States' criminal justice]. *Jurisprudencija*, *26*(2), 308–325. http://doi.org/10.13165/JUR-19-26-2-04

Jurka, R., & Zajančkauskienė, J. (2016). Movement of evidence in the European Union: Challenges for the European Investigation Order. *Baltic Journal of Law & Politics*, *9*(2), 56–84. https://doi.org/10.1515/bjlp-2016-0012

Macovei, M. (2004). *Freedom of expression: A guide to the implementation of Article 10 of the European Convention on Human Rights, January 2004, Human rights handbooks, No. 2*. Council of Europe. Retrieved from https://rm.coe.int/168007ff48

Maillart, J. (2019). The limits of subjective territorial jurisdiction in the context of cybercrime. *ERA Forum*, *19*, 375–390. https://doi.org/10.1007/s12027-018-0527-2

Mitsilegas, V. (2018). The privatisation of mutual trust in Europe's area of criminal justice: The case of e-evidence. *Maastricht Journal of European and Comparative Law*, *25*(3) 263–265. https://doi.org/10.1177/1023263X18792240

Murauskienė, D. (2019). *Rekomendacijos dėl baudžiamosios atsakomybės už neapykantos nusikaltimus ir neapykantą kurstančią kalbą taikymo* [The recommendations for criminal liability due to hate crimes and crimes, related to hate speech]. Vilnius: Ministry of Interior of the Republic of Lithuania. Retrieved from https://vrm.lrv.lt/uploads/vrm/documents/files/Rekomendacijos%20d%C4%97l%20baud%C5%BEiamosios%20atsakomyb%C4%97s%20taikymo(1).pdf

Normantaitė, K. (2017). *Atsakas į neapykantos nusikaltimus: situacijos Lietuvoje apžvalga* [Response to hate crimes: The overview of situation in Lithuania]. Vilnius: Human Rights Monitoring Institute. Retrieved from https://hrmi.lt/wp-content/uploads/2017/12/Atsakas-%C4%AF-neapykantos-nusikaltimus-2017-1.pdf

Organization for Security and Co-operation in Europe [OSCE]. (2003). Ministerial Council Decision No. 4/03 on tolerance and non-discrimination. Retrieved from http://www.osce.org/documents/mcs/2006/06/19330_en.pdf

OSCE ODIHR. (2009). *Hate crime laws. A practical guide*. Warsaw: OSCE Office for Democratic Institutions and Human Rights (ODIHR). Retrieved from http://www.osce.org/odihr/36426

Robinson, G. (2018). The European Commission's e-evidence proposal. *European Data Protection Law Review*, *4*(3), 347–352. http://doi.org/10.21552/edpl/2018/3/13

Ruling of the Constitutional Court of the Republic of Lithuania of 8 July 2005.

Ruling of the Supreme Court of Lithuania of 1 March 2016 in the Criminal Case No. 2K-86-648/2016.

Ruling of the Supreme Court of Lithuania of 13 March 2018 in the Criminal Case No. 2K-91-976/2018.

Sippel, B., & Melo, N. (2019). *2nd working document (B) on the Proposal for a Regulation on European Production and Preservation Orders for electronic evidence in criminal matters (2018/0108 (COD)) – Scope of application and relation with other instruments* [No. PE634.730v01-00]. European Parliament, Committee on Civil Liberties, Justice and Home Affairs. Retrieved from https://www.europarl.europa.eu/doceo/document/LIBE-DT-634730_EN.pdf?redirect

Smuha, N. A. (2018). Towards the EU harmonization of access to cross-border e-evidence: Challenges for fundamental rights & consistency. *EuCLR European Criminal Law Review*, *8*(1), 83–115. https://doi.org/10.5771/2193-5505-2018-1-83

Stefan, M., & González Fuster, G. (2018). Cross-border access to electronic data through judicial cooperation in criminal matters. *CEPS Paper in Liberty and Security in Europe*, No. 2018-07, 1–64. Retrieved from https://ssrn.com/abstract=3298705

Prosecutor General's Office of the Republic of Lithuania. (2020). *Ikiteisminio tyrimo dėl neapykantos nusikaltimų ir neapykantą kurstančios kalbos atlikimo, organizavimo ir vadovavimo jam ypatumų metodinės rekomendacijos* [The methodological recommendations for peculiarities of organisation and management of pre-trial investigation of hate crimes and crimes related to hate speech]. Retrieved from https://www.prokuraturos.lt/data/public/uploads/2020/04/neapykantos_nusikaltimu_tyrimo_metodines_rekomendacijos.pdf

Tinoco-Pastrana, A. (2020). The proposal on electronic evidence in the European Union. *Eucrim: The European Criminal Law Associations' Forum*, *2020*(1), 46–50. https://doi.org/10.30709/eucrim-2020-004

Tosza, S. (2020). All evidence is equal, but electronic evidence is more equal than any other: The relationship between the European Investigation Order and the European Production Order. *New Journal of European Criminal Law*, *11*(2), 161–183. https://doi.org/10.1177/2032284420919802

Dovilė MURAUSKIENĖ is a lecturer at Mykolas Romeris University Law School. Her doctoral thesis focuses on the issues of the protection of children's rights in criminal procedure. The main area of her scientific interest is vulnerable participants in criminal procedure.
ORCID ID: https://orcid.org/0000-0002-2758-2966

Raimundas JURKA is the professor at the Criminal Law and Procedure Institute at the Law School of Mykolas Romeris University, Lithuania. He is currently supervising doctoral students, participating in various scientific events and projects. Research interests: European Union criminal justice, international cooperation in criminal matters.
ORCID ID: http://orcid.org/0000-0002-9911-5611

Jolanta ZAJANČKAUSKIENĖ holds a PhD in law and is currently a professor of criminal procedure law and director of the Institute of Criminal Law and Criminal Procedure at the Law School of Mykolas Romeris University, Lithuania. Her research interests include special forms of criminal proceedings, vulnerable persons in criminal procedure, international cooperation in criminal matters.
ORCID ID: https://orcid.org/0000-0001-9714-653X

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

NEW APPROACH TO DETERMINING THE ECONOMIC POTENTIAL OF RURAL AREA ON THE EXAMPLE OF THE SOUTH BOHEMIAN REGION OF THE CZECH REPUBLIC[*]

Petra Pártlová [1], Zuzana Dvořáková Líšková [2], Miroslav Felcan [3], Jarmila Straková [4], Jan Váchal [5], Jozef Polomský [6]

[1,4,5,6]Institute of Technology and Business in České Budějovice, Faculty of Corporate Strategy, Department of Management, Okružní 517/10, 370 01 České Budějovice, Czech Republic
[2] University of South Bohemia, Faculty of Economics, Department of Regional Management České Budějovice, Branišovská 1645/31a, České Budějovice, 370 05, Czech Republic
[3]Academy of the Police Force in Bratislava, Sklabinská 1, 835 17 Bratislava 35, Slovak Republic

E-mails: [1] partlova@mail.vstecb.cz ; [2] zu.li@seznam.cz ; [3] Miroslav.Felcan@minv.sk ; [4] 4090@mail.vstecb.cz ; [5] 4027@mail.vstecb.cz ; [6] 24574@mail.vstecb.cz

Abstract. The paper discusses a new approach to determining the economic potential of rural area on the example of the region of South Bohemia in the Czech Republic. The approach is based on a comprehensive economic model, consisting of four sub-models (SM). Such aggregate model is used as the basis for the analysis of regional economic potential. The SMs were defined by the Progressivity Index of the Economic Structure, Trend of the Economic Structure Index, Business Activity Rate and Recreation and Tourism Index. The mathematical-statistical method of Stepwise backward analysis was used as an analytical tool. During this stage, the data database from Ekotoxa was used. Practically, the first two SMs named were verified. Furthermore, the implementation of the results was designed and tested by the researchers. Two research objectives were fulfilled, namely the construction of summary and partial models, and the

---

suitability of the analytical method tested are verified. Practical knowledge to deal with the situation in the region of South Bohemia was also obtained. The positively influencing factors for the economic potential of the region include the trend of increasing the number of people with university education, public transport services on weekdays, nursery facilities and population density. Negative factors include the natives and availability of secondary schools with the Maturita exam and landscape fragmentation. Within the mathematical modelling, it is possible to simulate the positive and negative response of additional inputs to the tested factors.

Keywords: economic potential; rural space; Stepwise backward analysis; Summary economic model; Sub-model

1. Introduction

Economic potential (business potential in particular as its most important component) is described as a limiting factor for the rural area, its sustainability and development. In the rural areas, mostly the SMEs operate, and they are the backbone of every national economy within the European Economic Area (Kramoliš & Dobeš, 2020). Rural entrepreneurship is defined as entrepreneurial activities embedded in a distinctive environmental space, predominantly with local and regional scope, with a large spatial dimension, low settlement rates and often imperfect structures (Kalantaridis and Bika 2006b; Korsgaard, Muller, Tanvig 2015).

Another characteristic is related to the creation of new values, based on the use of resources from the environment (Razvanta 2019). It is a fact that the share of rural areas within the EU, and in the Czech Republic is between 60-70%. Despite such dominance in terms of acreage, there is not yet an exact anchoring of the definition of rural space in the valid legislation of the Czech Republic (similarly in some EU countries). The reason is the ambiguous and polarized space, as there are different rural regions. These regions have different development potentials (Perlín, 2010; Skála, 2017). Many authors agree that the definition of rural areas should be derived from the characteristics of rural business, which is still a decisive and also limiting factor for rural stability. Business activities are gaining in diversity by ensuring the diversification of the social and social climate. At the same time, however, they are severely restricted in rural areas in some regions (Korsgaard et al. 2015; Dubois 2016; Bosworth, Turner 2018).

In the countries of the European Union, the rural areas cover an area of approximately 1,928.7 km2, i.e. 42.3% of the geographical surface of the European Union. These areas are populated by 82 to 97 million citizens (World Bank, Eurostat). These data indicate that one in four citizens of this economic and political group lives in rural areas. Many of them are in the middle and lower property class (Barczyk, Musial, Zukovskis 2019, Anyakoha, 2019). Outside the EU, such situation is even clearer, especially in rural areas of developing countries (Ksoll, Lilleor, Lonborg, Rasmussen 2016). Worldwide rural business employs about 40% of the world's population (AgFunder 2017). This amount contributes to 30% of GDP in developing countries (Mayorova, Domzal, Gernego, Dyba 2019). On the contrary, in EU countries it is more than 60%. Therefore, understanding rural vitality and viability is an important research problem at the beginning of the 21st century.

Rural vitality is defined as an area where strong, active and inclusive relations between the citizens, private space, public space and civil society organizations co-operate in economic, social and environmental space. Due to the growth of urban agglomerations, interest in a certain type of rural areas is increasing, including the use of their

production areas. These production rural areas are becoming areas for housing, recreation of the urban residents, and also for the useful production capacity, as seen in many places in the Czech suburban countryside (Eimermann, Karlsson 2018).

The rural space of the Czech Republic went through a turbulent development in the last century. A major turning point came in 1989, when its historical mission, traditions, including crafts and small businesses returned to the Czech rural area. At the same time, however, negative tendencies, such as socio-economic inequality compared to urban regions started occurring (Blažek and Netrdová 2012). Such a negative trend is also relatd to a significant decline in the population from these peripheral, non-developing regions, in particular the outflow of professionally qualified and university-educated people (Ouředníček et al. 2011). Progressive activities, skilled work and university educated people are concentrated in dynamically forming metropolitan areas while rural areas are stagnant (Ouředníček et al. 2011; Hampl, Marada 2016) Business activities are disappearing from many rural settlements. Enterprises with predominant craft and agricultural production disappear or move to larger conurbations. Insufficient services and facilities are also apparent in the countryside. The frequency of public transport is decreasing. Job opportunities are limited, and the social and cultural activity of the population is declining (Korauš et al. 2020). However, these phenomena do not occur everywhere and to the same extent (Perlín et al. 2010; Novák and Netrdová, 2011; Jašková, 2019).

At the beginning of the 21st century, scientific work increased its importance, declaring the need to ensure sustainable development, stability and a suitable business environment for the SMEs in rural regions (Ammirato, Felicetti, Della Gala, Frega 2017; Lazikova et al. 2018; Mészáros, Divékyová, 2019; Mura, Kajzar, 2019; Mura et al. 2018; Horváth, Hollósy, 2019). The rural areas often face problems associated with reduced economic and development capacity. Furthermore, these areas are associated with lower profitability, low economic potential, and the development of community planning. (Horiuchi 2017; Steiner; Teasdale 2019; Azhaman; Petryshchenko 2019, Belas et al. 2016, Dobrovič et al. 2018, Dobrovič et al. 2016). As a result of the downturn of the traditional handicrafts in the country, the predominant incomes from non-agricultural sources are important. The share of agricultural income continues to decline, right now at a slower pace (Pastusiak 2017; Barczyk et al. 2019). This process is exacerbated by the outflow of young people from the rural areas (Bosworth, Turner 2018). For this reason, the development of the rural areas is one of the main objectives of the development policy of the European Union. However, there is still no single approach to its definition and measurement (Straka, Tuzova 2016; Milone, Ventura 2010). The traditional model used is based on the hypothesis that, in rural areas, agriculture, in general, is considered to be often the only and main source of income that helps to foster rural development (Singgalen et al. 2019; Seilerová 2019).

The region of South Bohemia is characterized by its incompactly distributed settlement structure and low population density in contrast to a relatively large area. Due to the absence of more large towns, the region of South Bohemia is perceived as an area with a high proportion of agricultural, forestry and fishing activities. The localization of the region falls mostly in the area of the south of Bohemia.

With its area of 10,056m^2 (of the total area of 12.8% from the Czech Republic), the South Bohemian region is the second largest, in terms of the population of 643,176 it is the 6th most populous region in the Czech Republic. The population density per square kilometre is 63.95. In terms of percentage of population living in small municipalities (classified up to 200 inhabitants), it is 4.3%, and compared to the number of these municipalities it is 37.4%, and 63.8% of the population living in the towns. Comparing the present character of settlement (population and landscape population, visual stability of settlements, density of settlements, etc.), character of agriculture (size of land, type of livestock buildings) and character of surrounding cultural landscape, South

Bohemia is defined as the rural region. The position and role of the South Bohemian countryside is quite significant on a nationwide scale as the rural character creates significant disparities throughout the region. During its operation, the region deals with the problems typical the rural area. This is mainly due to an imbalance in terms of the availability of some services, or not to a fully developed infrastructure. Especially in the peripheral parts of the region, but also in the border area, there are rural areas whose stability and development are limited by factors such as worsening and increasing transport accessibility, lower availability of job opportunities, public services including cancellations of post offices, schools, shops and low support for small and medium-sized enterprises, etc.

Effective, sustainable and feasible solution of rural space in terms of its prosperity and development presupposes knowledge of its regional (economic, business) potential (Orynbassarova et al. 2019; Selivanova-Fyodorova et al. 2019; Perlín, 2008). By Skála (2017), the development potential is a complex of possibilities providing preconditions for further development of the municipality and increase the quality of life of the inhabitants in the countryside (Sobczyk, 2014). Development potential can be seen as a certain impulse that will stimulate and accelerate development (Hoggart and Buller, 2016; Štefko 2019; Vlacseková 2019). Development potential is defined by disposition, abilities and capacities that will lead to a positive change from the current situation in the future (Leitmanová et al., 2012, Rák 2012). Identifying development potential, and identifying key development factors, is an important knowledge for properly targeting development activities and payment security (Korauš et al. 2019a, Korauš et al. 2019c, Kopencova 2020; Rajnoha et al. 2017). In theories of regional development, factors are divided into exogenous and endogenous. In practice, these factors are not fundamentally opposed; however, they rather complement each other. Exogenous approaches express initiated development from the outside, which is dependent on external incentives and interventions, especially by the state. On the other hand, endogenous approaches, where development cannot be achieved solely by support from above, they need to be based on the bottom approach (Chromý, Skála 2010; Chromý et al. 2011; Okanazu et al. 2019; Kijek, Matras-Bolibok, 2020), depend on local impulses and resources, initiative and active participation of local and regional actors. These interdependent and conditional potentials have different character and different influence on the development of rural space. (Bernard ed. 2011).

This paper focuses on the issue of determining the development, i.e. the economic potential, in the region.

2. Methods

The research used secondary data from Ekotoxa. The data were divided into four pillars (economic, social, infrastructure-institutional and environmental). In total, 602 municipalities in 17 local action groups of the South Bohemian Region were analyzed, except for towns with a population of over 25,000, i.e. all municipalities that may be part of a regional LAG. A total of 29 indicators were selected. The proposed and subsequently selected indicators were consulted by CzechInvest and some adjustments of the indicators were made by Ekotoxa.

Finally, four indicators were selected in the economic; seven indicators in the social pillar; eleven indicators in infrastructure; and seven indicators in the environmental pillar. The indicators were assigned codes from K101 to K407, see Table 1.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Table 1. Indicators of the pillars

KOD	Economic pillar	K304	Accessibility of the area by the public transport on Saturday
K101	Progressivity Index of the Economic Structure	K305	Accessibility of the area by A and major roads
K102	Trend of Progressivity Index of the Economic Structure	K306	Accessibility of railway stations
K103	Rate of Business Activity	K307	Residents living in permanently occupied dwellings connected to water supply, gas and public sewerage
K104	Natural Presumptions of Recreation	K308	Nursery school facilities
KOD	Social pillar	K309	Primary school facilities
K201	Population Density	K310	Accessibility of secondary schools with Maturita
K202	Aging of Population (increase of the number of senior citizens) – Aging index trend	K311	Accessibility of senior care homes
K203	Economic load index trend	KOD	Environmental pillar
K204	Natives	K401	Production capacity of land resources
K205	Trend in the growth of the population with higher education	K402	Ecological fragmentation
K206	Unemployment trend	K403	Share of water areas
K207	Czech citizenship	K404	Chemical status of surface water
KOD	Infrastructure pillar	K405	Soil visualization trend
K301	Accessibility of the area by the public transport on weekdays	K406	Forest hazard zones
K302	Accessibility of the area by the public transport on Saturday	K407	Trend of specific territorial emissions from stationary source
K303	Accessibility of the area by A and major roads		

Source: own processing

The analytical tool used was the Stepwise Backward Analysis, a method of backward step regression for the calculation of economic models of the region of South Bohemia. Using this method, the dependence of other factors on the economic pillar factors was tested with the aim of projecting the most optimal economic pillar model for the rural area of the region of South Bohemia.

The method of gradual regression is the method of finding the most appropriate model (the smallest number of independent variables, the highest quality prediction). The subject of the analysis is not to determine the order of variables (predictors) in terms of their entry into the model; this is a part of the algorithm of the program itself. The programme is used in two variants - forward and backward. A reverse variant was used, in which all predictors are included first and then gradually removed and their significance within the tested indicator is analysed.

The principle of gradual regression is that the regression model is built step by step by examining all the predictors in each step to determine which of them best describes the variability of the dependent variable.

Both the inclusion of the predictor into the model and its exclusion is done by sequential F-tests. The sequential F-test is based on the F statistic, which is the ratio of the increment of the regression sum of squares when the predictor is included in the model and the residual sum of the squares. If this statistic is greater than the value

called "F to enter", the predictor is included. If the F statistic is less than the value called "F to remove", the previously included predictor is excluded from the model.

After determining the variables into the model, the parameters of the linear regression function are estimated, and the quality of the regression is assessed by the determination index. Additional variables are gradually added to the model as the proportion of the explained variability of the magnitude increases.

Before the research, two research questions were formulated: The first one is related to the design of an economic model that would allow determining the economic potential of the territory; the second question focuses on finding and verifying a suitable analytical method for the proposed models. A partial objective was the real results of the research, in terms of usability and informative value for the users of results.

3. Results and discusion

3.1 Projection of the model for the analysis of regional economic potential

To analyse the economic potential of rural areas, a "Global Economic Model - GEM" is proposed consisting of four "Sub-Models - SM 1 to 4" used as a potential basis for the analysis of regional economic potential:
- Sub Model 1: Progressivity Index of Economic Structure (INXPES).
- Sub Model 2: Economic Structure Index Trend (TIES).
- Sub Model 3. Business Activity Rate (BAR).
- Sub Model 4: Recreation and Tourism Index (RATI).

Due to the limited extent of the paper, the analysis procedure for the Progressivity Index of the Economic Structure and the Trend of the Economic Structure Index are presented in full.

3.1.1   The index of progressive economic structure

The index of progressive economic structure (INXPES) is identified by the researchers as the decisive territorial index, determining the socio-economic differentiation of the regions in the Czech Republic. It is designed and constructed as a weighted sum of the proportion of the economically active enterprises in the primary sector, twice the proportion of the economically active in the secondary sector and three times the proportion of the economically active in the tertiary sector.

The algorithm of the method is that through its use, the explanatory variables are determined in the economic model of the regression function so that all the explanatory variables are initially included in the resulting model. In the next steps, the variable with the largest p value (i.e. the least statistically significant variable) is removed. This is done until an optimal regression model is found. Using the stepwise backward regression method, six explanatory variables are found that influence the progressive index of the economic structure. The resulting regression model is as follows:

$$Mp = \hat{y} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6$$

Mp=$\hat{y}$- sample (empirical) regression function – complete model

Each β_i for each indicator in the table is labelled as *Estimate*s *Beta.*

The resulting regression function is as follows:

$$\hat{y} = 2{,}600 - 0{,}006x_1 + 0{,}006x_2 + 0{,}001x_3 - 0{,}014x_4 - 0{,}003x_5 + 0{,}188x_6$$

and:

$x_1 = K204$ The natives

$x_2 = K205$ Trend in the growth of the population with higher education

$x_2 = K205$ Accessibility of the area by the public transport on weekdays

$x_4 = K306$ Nursery school facilities

$x_5 = K308$ Accessibility of secondary schools with Maturita

$x_6 = K402$ Landscape fragmentation

The input data for the input factors x_1 to x_6 are analysed using the regression equation. The results of the analysis are shown in Table 2.

Table 2. The index of progressive economic structure

Model Summary					
R	0.542	Root Mean Square Error (RMSE)	0.135		
R-Squared	0.294	Coef. Var	5.625		
Adj. R-Squared	0.286	Mean Square Error (MSE)	0.018		
Pred R-Squared	0.272	Mean Absolute Error (MAE)	0.100		
ANOVA					
	Sum of Squares	DF		Mean Square	F	Sig.
Regression	4.497	6		0.749	41.206	0.000
Residual	10.822	595		0.018		
Total	15.319	601				
Parameter Estimates						
model	Beta	Std. Error	Std. Beta	t	Sig	lower	upper
(Intercept)	**2.600**	0.035	-	73.668	0.000	2.530	2.669
K204	**-0.006**	0.001	-0.301	-8.551	0.000	-0.007	-0.004
K205	**0.006**	0.002	0.106	3.036	0.003	0.002	0.010
K301	**0.001**	0.000	0.268	6.689	0.000	0.001	0.001
K306	**0.014**	0.005	0.113	3.115	0.002	0.005	0.023
K308	**-0.003**	0.001	-0.099	-2.729	0.007	-0.005	-0.001
K402	**0.188**	0.094	0.074	1.995	0.046	0.003	0.372

Source: own research

The authors use the following procedure to present the results of the analysis of the sub-models:
   a) *Assessment of the value of signification.*

By the results shown in Table 2, the value of signification is 0.000 (the value below 0.05), in the sample, so that there are strong relations between the variables.

b) *Intensity of multiple dependences in the tested model.*

The aim is to determine the variability of the analysed set of variables for the tested index. The intensity of multiple dependencies is characterized by a multiple correlation coefficient, which is the square root of R-squared adjusted (see the table above).

$$r_B = \sqrt{0,286} = 0,534789$$

By the value of R-squared adjusted (the adjusted index of determination) shown in Table 2, it is revealed that the combined action of all six explanatory variables (natives, the trend of population growth with tertiary education, public transport on weekdays, nursery facilities, availability of secondary schools with Maturita and ecological fragmentation) 28.6% variability of the explained variable of the progressive index of economic structure is explained.

c) *Determining the directions of action of the test factors (positive and negative effects on the test index).*

As shown in Table 2 (Beta column), the following factors influence the economic structure of the South Bohemia: Trend in the growth of the population with higher education, Transport services of the territory by public transport on weekdays, Nursery facilities and Landscape fragmentation. Regarding landscape fragmentation, the significance is not considerable and therefore there is no indication of the relation to the tested index. However, by the authors it also expresses the limiting value for the progressivity index of the economic structure. The factor of the natives and the availability of secondary schools with Maturita are negative.

d) *Practical (point values) expression of a benefit and loss for each factor tested.*

As shown in Table 2 (Model, Beta and Significance factors), it is possible to carry out a point-value or financial calculation (assuming the value of one point is defined, the authors are currently working towards the methodology within the proposed method).

The resulting regression model revealed that increasing the trend of increasing the number of inhabitants with higher education, transport services of the territory by public transport on weekdays and Nursery school facilities by one point increases the progression index model by 0.006, 0.001 and 0.014 points, assuming that the values of the other variables are unchanged. The opposite trend occurs in the factors of the natives and availability of secondary schools with Maturita - an increase of one point decreases the value of the index of economic structure of the region by 0.006 and 0.003 points.

For the landscape fragmentation factor, where the Significance Value is 0.046, benefit modelling is irrelevant as there is no relation to the other factors.

e) *Description of the factors by the results.*

- The Natives:

The natives are related to the share of inhabitants born in the municipality of habitual residence. They usually have a stronger relationship with their native village. Also, the life in a micro-region offers certain life benefits for inhabitants born there; however, it might not be so attractive to other residents that moved in. It is assumed that a higher proportion of the natives is a sign of some developmental stagnation and higher degree of peripheral nature.

- Trend in population growth with higher education:

University educated population and its trend is an important indicator defining the quality and quantity of human resources, influencing the employment in the territory, development of the business environment, overall economic development of the territory, and also the functioning of the municipalities. In the area of human resources, the South Bohemian region is facing a shortage of labour, and a long-term trend of increasing the

921

number of job applicants not meeting the demands of the employers, including the university graduates. The main problems are mostly related to the decreasing interest in technical disciplines and inconsistency between the employers' requirements and the profiles of school graduates.

The region of South Bohemia, in comparison with the other regions, is rated as the average. The areas near České Budějovice (such as Hlubocko-Lišovsko, Netolicko) report the best situation. To the contrary, the areas of střední Povltaví, Blatensko, Bechyňsko (LAG Lužnice) are rand as the worst.

- Transport services of the territory by public transport on weekdays

The indicator defines the quantity of bus and railway connections, and the level of transport services to the municipality from other territories, otherwise defined as transport accessibility. The number of public transport connections in the region of South Bohemia is one of the lowest in the Czech Republic and it is 42 connections (14th among all the regions). The lack of public transport services is particularly difficult in small municipalities located on the outskirts of the region. On the other hand, the regions around the regional town of České Budějovice (LAG Hlubocko-Lišovsko, LAG Růže, LAG Pomalší) report excellent transport services.

Transport services are also defined using the term transport accessibility. Transport accessibility is understood as a structural morphological feature of the communication network, as communication availability of nodes. Accessibility is understood as the ability of a territory to be reached and to reach various other sites. Availability significantly affects the spatial organization and structure of the cultural landscape. Increasing availability regulates the economic development of the settlements. Higher number of connections in the municipality determines higher accessibility of the municipality, indicated as attractiveness and emtivity (potential of the settlements to create interactions) of the territory.

- Nursery school facilities

Most nursery school facilities are located in larger towns and centres of municipalities with extended powers. Most nursery schools are located in large towns with the population over 10,000 inhabitants. On the other hand, the lowest number of nursery schools is in municipalities with less than 300 inhabitants. It was also verified that the municipalities with the population over 1,000 occupy 64% of the total number of the nursery schools in the region and are better equipped with pre-school education compared to the municipalities with a lower population. There is sort of a direct and proportional link, as a larger population means more children and consequently a higher demand for pre-school facilities.

- Accessibility of secondary schools with Maturita

In the region of South Bohemia, more than half of the secondary technical schools and vocational schools are concentrated in district towns. Those interested in studying here have a greater choice of study and teaching fields. However, many schools are also located in other towns, and their focus often results from the economic and geographical conditions and traditions of the region. The largest number of pupils is in general preparation, i.e. the grammar schools, the second largest group of secondary school classes is in the field of Mechanical Engineering and Manufacturing, and in proportion to the other groups their number is increasing steadily, especially in recent years. This is largely due to a wide choice of the support for technical education, followed by agriculture and forestry and gastronomy, hotel and tourism. The ranking of the first three places has been the same for the third year.

- Landscape fragmentation

With regard to the environmental character of the region, fragmentation of the landscape is generally a negative factor, assuming that a stable landscape is the basis for healthy and sustainable economic growth of the territory. One of the main reasons for landscape fragmentation is primarily related to the construction and use of linear transport infrastructure, in addition to agricultural production and urbanization. This includes roads, railways and waterways. Linear routes divide the territory they pass through into smaller and smaller parts, fragmenting the area, affecting the life in the landscape negatively. Fragmentation of the landscape is related to nature conservation and it is also irreplaceable for the life of humans in rural space and for the stability in the arras. Fragmentation barriers in nature reduce the landscape potential for recreation and the permeability of the landscape to allow free movement. The landscape divided into small segments by settlements and transport, with consequent noise and emission load, is losing the potential. In summary, the fragmentation of the landscape in the region of South Bohemia will grow in the future by building a motorway, road and rail network, urbanization and construction of buildings for business activities; thus, a negative impact on the economic potential of the territory is expected.

3.1.2 Economic Structure Index Trend

Economic Structure Index Trend (TIES) is the second partial model tested in the total model. The trend follows the analysis of changes in the sectoral structure of employment in terms of the current level and its future potential. Using the stepwise backwards regression method, two explanatory variables are selected that significantly affect the progressive index of the economic structure. The resulting regression model is as follows:

$$Mp = \hat{y} = \beta_0 + \beta_1 X_1 + \beta_2 X_2$$

Mp=$\hat{y}$-sample (empirical) regression function – complete model

Each β_i for each indicator in the table is labelled as *Estimates Beta.*

$$\hat{y} = 0{,}186 + 0{,}000x_1 - 0{,}242x_2$$

$x_1 = K201$ Population density

$x_2 = K402$ Landscape fragmentation

The input data for the input factors x_1 and x_2 are analysed using the regression equation. The results of the analysis are shown in Table 3.

Table 3. Economic Structure Index Trend

Model Summary					
R	0.166	Root Mean Square Error (RMSE)	0.136		
R-Squared	0.028	Coef. Var	80.779		
Adj. R-Squared	0.024	Mean Square Error (MSE)	0.018		
Pred R-Squared	0.020	Mean Absolute Error (MAE)	0.093		
ANOVA					
	Sum of Squares	DF	Mean Square	F	Sig.
Regression	0.313	2	0.156	8.49	2e-04
Residual	11.006	598	0.018		
Total	11.319	600			
Parameter Estimates					

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

model	Beta	Std. Error	Std. Beta	t	Sig	lower	upper
(Intercept)	0.186	0.007	-	25.875	0.000	0.172	0.201
K201	0.000	0.000	-0.098	-2.361	0.019	0.000	0.000
K402	-0.242	0.090	-0.112	-2.685	0.007	-0.420	-0.065

Source: own research

The following procedure is used to present the results of the analysis of the sub-model:
  a) *Assessment of the value of signification.*

As revealed by the significance of 2e-04 (value below 0.05), there are strong links of the variables in the sample.
  b) *Intensity of multiple dependences in the tested model*

The intensity of multiple dependencies is characterized by a multiple correlation coefficient, which is the square root of R-squared adjusted (see the table above).

$$r_B = \sqrt{0,024} = 0,1549$$

As revealed by the value of R-squared adjusted (adjusted index of determination), the joint action of two explanatory variables (settlement density and ecological fragmentation) explains 2.4% of the variability of the explained variable of the economic structure index trend.

  c) *Determining the directions of action of the test factors (positive and negative effects on the test index).*

The Population Density Factor has a positive effect on the trend of the economic structure index. The opposite, i.e. negative, direction of action is indicated for the landscape fragmentation factor.

  d) *Practical (point values) expression of a benefit and loss for each factor tested.*

The regression model also suggests that increasing the population density by one point will not change the trend of the economic structure index, although a positive effect is assumed if the other variables are unchanged. The opposite trend, i.e. the negative effect on the Index, is reported for the factor of landscape fragmentation, as an increase of this factor by one point results in a decrease in the value of the trend of the economic structure index of the region by 0.242 points.

  e) *Description of the factors by the results.*

The linear model proves a dependence on population density and landscape fragmentation. Population density usually indicates the attractiveness of the territory, including sufficient cultural development in the region. The sufficient amount of human resources also predicts a certain direction in land use. The possible negative effects of this factor include the case of extreme population density, which would be in conflict with the potential economic capacity of the territory, which is not possible in the region of South Bohemia.

Increased value of the landscape fragmentation is usually related to intensive development of residential, industrial and transport infrastructure, greater urbanization of the territory, and the division of natural localities, which may have a negative impact on the attractiveness of the area and on its ecological stability. Migration barriers are landscape structures that prevent the free movement of animals. In terms of the calculation of the fragmented area, the following groups were selected as the main barriers: motorways and expressways, roads I, II. III. class, double - track and other railways. Therefore, this indicator is also defined by the fact that the higher the degree of fragmentation of the territory, the better, high-quality and faster transport service to the region. The least fragmented area is the area of Trhové Sviny and Nové Hrady (LAG Růže), the whole area of Šumava (LAG Šumavsko and LAG Rozkvět) and LAG Blanský les and Netolicko.

Similarly, the remaining two partial models were tested, in particular the business activity rate and recreation and tourism index.

4. Results and Discussion

Before the research, two research questions were formulated: The first one is related to the design of an economic model that would allow determining the economic potential of the territory; the second question focuses on finding and verifying a suitable analytical method for the proposed models. A partial objective was the real results of the research, in terms of usability and informative value for the users of results. The following par of summary and recommendations discusses the fulfilment of the above-mentioned objectives.

Before testing the comprehensive economic model, the structure of the economic pillar was proposed, consisting of 31 indicators reflecting the specificities of the regions in the Czech Republic. The final scope can be determined only after the general application in all the regions in the Czech Republic. However, their number and structure are sufficient for the region of South Bohemia.

Prospectively, there is a need to precisely define the procedure for collecting relevant secondary and primary data, to specify the minimum extent of the reference period, to define the qualitative aspect of the data base and the form of data processing prior to the actual use for the analyses.

The proposed comprehensive economic model, consisting of four sub-models (Progressivity Index of Economic Structure, Trend of Economic Structure Index, Business Activity Rate and Recreation and Tourism Index), is suitable for expressing the current and predicted development capacity of the relevant territorial unit. The first sub-model is considered decisive in terms of socio-economic differentiation of individual regions within the state. The index of progressivity of the economic structure is described as a decisive territorial index in terms of regional differentiation, its construction (weighted sum of the share of economically active enterprises in the primary sector, double the share of economically active in the secondary sector and three times the share of economically active in the tertiary sector) is appropriate. The second index - The trend of the index of economic structure progressivity - is based on the data base of the development trend and it follows the analysis of changes in the sectoral structure of employment in terms of the current level and its future potential. The construction of this index also provides appropriate outputs; however, the range of analyzed factors (so far, there are two - population density and landscape fragmentation) might increase.

The proposed procedure for the presentation of the results of the mathematical-statistical analyses is the first approximation of the solution with the assumption of its gradual refinement and completion. Regarding the structure of the output analytical report, the proposed procedure of evaluation of the results is evaluated in the following way: assessment of the signification value, intensity of multiple dependencies in the tested model, determination of directions of influence of the tested factors (positive and negative influence on the test index) benefits and losses of the factors and characteristics of the analyzed factors from the point of view of their suitability for management, administrative bodies and business practice.

In addition to the design of a comprehensive economic model and its four sub-models, another research objective was to design and validate an appropriate analytical method to ensure valid and applicable outputs into the social and business practice (Korauš et al. 2019). Stepwise backward analysis was chosen and tested based on the

selection of suitable mathematical-statistical methods. It is not possible to make a final decision; however, in accordance with the obtained results, its usability for the required analyzes is proved. A part of the input (data) to the analysis tool is necessary to complete. The evaluation of the quality of regression by the determination index and the determination of the intensity of multiple dependences by means of multiple correlation coefficients are useful.

Regarding the practical outputs aimed at the region of South Bohemia, it is possible:

To point to the following conclusion related to the Progressivity Index of Economic Structure:

- The trend of increasing the number of people with university education, public transport services on weekdays, and nursery facilities are reported to be the positively influencing factors for the economic potential of the region of South Bohemia. The natives and availability of secondary schools with the Maturita exam are the negative factors. On this basis, the expected benefits and losses of additional financial deposits and investments were tested;
- Regarding the characteristics of the factors and the possibility of their use in terms of strengthening the economic potential of the region of South Bohemia, there are increased issues in the area of loss of skilled labour resources, including the university graduates, gradual but permanent loss of the native population, decrease of business activity, reduced level of service including transport, availability of secondary schools with Maturita exam is sufficient. The negative trend is related to in the departure of the students to study universities in other centres such as Prague, Brno and Plzeň. The strengthening trend of landscape fragmentation also does not contribute to strengthening the economic potential of the region.

To point to the following conclusion related to the Trend of the Progressivity Index of Economic Structure:

- Regarding the effect on the economic structure growth trend, there is a positive effect of the population density factor. The opposite, i.e. negative direction of action, is reported for the landscape fragmentation factor.
- In terms of the impact of the factors related to additional deposits, financial and other types, there is a zero response in case of the population density, although a positive effect is assumed provided the other variables are unchanged. On the other hand, the factor of landscape fragmentation has a negative financial effect, decreasing the trend index of the economic structure of the region, the most significantly of all the tested factors.
- The population density is one of the smallest in the Czech Republic and such trend continues. In the case of landscape fragmentation, a similar conclusion as in the previous index is reached; on the one hand the entrepreneurs welcome its increasing intensity, on the other hand there is an irreversible damage to the environment.

Conclusions

Many scientific workplaces both at home and abroad address the issue of stabilization and development of rural areas. The solution proves to be a limiting factor in ensuring the functionality of small and medium-sized enterprises in this area, as a decisive socio-economic accelerator and stabilizer for the rural areas. A prerequisite for a successful solution to the development of business activities is, however, knowledge of economic, and business potential. It is a fact that there is not a method available that would analyse, evaluate and present the business potential of the relevant area for its gradual fulfilment. The researchers respond to this fact and submit a new methodological procedure for scientific discussion that would respond to the real need of management and business practice. The results indicate both the appropriateness of the proposed methodical approach in terms of expertise and the suitability of the mathematical-statistical methods used, the way of presenting the results and their use in management and business practice.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

The authors are aware that this is the initial approximation of the results and some area of the methods need to be defined more precisely, and in particular, it is necessary to test the proposed model in a wider range. It is also necessary to precise the secondary data sample, to ensure their complementation and deepening by collecting the primary data with the preferential use of accessible database files. The presented results should support opening wider scientific discussion on the issue, which has long been lacking.

References

Agfunder, (2017). Year in Review 2017: AgFunder AgriFood Tech Investing Report. Available at: https://research.agfunder.com/2017/AgFunder-Agrifood-Tech-Investing-Report-2017.pdf

Ammirato, S., Felicetti, A., M., Della Gala, M., & Frega, N., (2017). Sustainable Development for Rural Areas: A Survey on the Agritourism Rural Networks. Collaboration in a data-rich world. 506, pp. 564-574. https://doi.org/10.1007/978-3-319-65151-4_50

Anyakoha, C. (2019). Job analysis as a tool for improved organizational performance of SMEs in Lagos, Nigeria. Central European Journal of Labour Law and Personnel Management, 2(1), 7-16. https://doi.org/10.33382/cejllpm.2019.02.01

Azhaman, I., & Petryshchenko, N., (2019). Development of construction investment in the rural area. Baltic journal of economic studies. 5(2), 1-9. https://doi.org/10.30525/2256-0742/2019-5-2-1-9

Barczyk, J., Musial, W., & Zukovskis, J. (2019). Barriers and opportunities to the development of small business in rural areas. Management theory and studies for rural business and infrastructure development. 41(1), 114-125. ISSN 2345-0355. https://doi.org/10.15544/mts.2019.11

Belás, J., Korauš, M., Kombo, F. & Korauš, A. 2016. Electronic banking security and customer satisfaction and in commercial banks, Journal of Security and Sustainability Issues, 5(3), 411-422. https://doi.org/10.9770/jssi.2016.5.3(9)

Bernard, J., (2011). Endogenní rozvojové potenciály malých venkovských obcí – obtížné hledání a měření jejich vlivu (Endogenous development potentials of small rural communities - difficult to find and measure their impact). Sociologický časopis/Czech Sociological Review, 47(4), 745–775. https://www.jstor.org/stable/23073230

Blažek, J., & Netrdová, P., (2012). Contemporary tendencies of the development of spatial pattern on the local level in Czechia: towards higher fragmentation of the spatial pattern? Geografie, 117(3), pp. 266-288. https://doi.org/10.37040/geografie2012117030266

Bosworth, G., & Turner, R., (2018). Interrogating the meaning of a rural business through a rural capitals framework. Journal of rural studies, 60, 1-10. https://doi.org/10.1016/j.jrurstud.2018.02.002

Dobrovič, J., Rajnoha, R., & Korauš, A. (2018). Effectiveness and performance of tax system in Slovak Republic in terms of its key non-macroeconomics factors. Oeconomia Copernicana, 9(4). https://doi.org/10.24136/oc.2018.030

Dobrovič, J., Korauš, A., & Dančišinová, L. 2016. Sustainable economic development of Slovakia: factors determining optimal tax collection, Journal of Security and Sustainability Issues, 5(4), 533-544. https://doi.org/10.9770/jssi.2016.5.4(7)

Dubois, A., (2016). Transnationalising entrepreneurship in a peripheral region – the translocal embeddedness paradigm. Journal of Rural Studies, 46, pp. 1–11. https://doi.org/10.1016/j.jrurstud.2016.05.003

Eimermann, M., & Karlsson, S., (2018). Globalising Swedish countrysides? A relational approach to rural immigrant restaurateurs with refugee backgrounds. Norsk geografisk tidsskrift-norwegian journal of geography. 72(2), 82-96. https://doi.org/10.1080/00291951.2018.1450781

Hampl, M., & Marada, M., (2016). Metropolization and regional development in Czechia during the transformation period. Geografie, 121(4), 566–590. https://doi.org/10.37040/geografie2016121040566

Hoggart, K., & Buller, H., 2016. Rural development, Routledge, New York, 317 pp. ISBN-13: 978-0709937562

Horiuchi, S., (2017). Entrepreneurs' networks at rural market: developing a creative village in the Yamagata prefecture, Japan. Economics & sociology. 10(3), 251-265. https://doi.org/10.14254/2071-789X.2017/10-3/18

Horváth, Zs., Hollósy, V. G. (2019). The revision of Hungarian public service motivation (PSM) model. Central European Journal of Labour Law and Personnel Management, 2 1), 17-28. https://doi.org/10.33382/cejllpm.2019.02.02

Chromý, P., Jančák, V., Marada, M., & Havlíček, T., (2011). Rural Areas – Living Space: Regional Differences in the Perceptions of Representatives of Rural Municipalities in Czechia Regarding Rural Areas. Geografie, 116(1), 23–45. https://doi.org/10.37040/geografie2011116010023

Chromý, P., & Skála, J., (2010). Cultural-geographical aspects in the development of borderland peripheries: an analysis of selected elements of territorial identity among residents of the Sušicko region. Geografie, 115(2), 223–246. https://doi.org/10.37040/geografie2010115020223

Ievoli, C., Belliggiano, A., Marandola, D., Milone, P., & Ventura, F., (2019). Information and communication infrastructures and new business models in rural areas: the case of Molise region in Italy. European Countryside. 11(4), pp. 475-496. https://doi.org/10.2478/euco-2019-0027

Jašková, D. (2019). Assessment of social development in Slovakia in the context of human resources. Central European Journal of Labour Law and Personnel Management, 2(2), 21-32. ISSN 2644-4917. https://doi.org/10.33382/cejllpm.2019.03.02

Kalantaridis, CH., & Bika, Z. (2006). Local embeddedness and rural entrepreneurship: case-study evidence from Cumbria, England, Environment and Planning A, Pion Ltd, London, 38(8), pp. 1561-1579. https://doi.org/10.1068/a3834

Kijek, A., & Matras-Bolibok, A. (2020). Technological convergence across European regions. Equilibrium. Quarterly Journal of Economics and Economic Policy, 15(2), pp. 295-313. https://doi.org/10.24136/eq.2020.014

Kopencova, D. (2020). Secondary education with security focus. INTED 2020 Proceedings, pp. 2477-2481. 14th International Technology, Education and Technology and Development Conference. 2nd-4th March, 2020, Valencia, Spain. ISBN: 978-84-09-17939-8, ISSN: 2340-1079. https://doi.org/10.21125/inted.2020.0755   https://library.iated.org/view/KOPENCOVA2020CZE

Korsgaard, S., Muller, S., & Tanvig, H., W., (2015). Rural entrepreneurship or entrepreneurship in the rural – between place and space. International journal of entrepreneurial behaviour & research. 21(1), 5-26. ISSN 1355-2554. https://doi.org/10.1108/IJEBR-11-2013-0205

Korauš, A., Gombár, M., Kelemen, P., & Polák, J. (2019a). Analysis of respondents' opinions and attitudes toward the security of payment systems, Entrepreneurship and Sustainability Issues, 6(4), 1987-2002. https://doi.org/10.9770/jesi.2019.6.4(31)

Korauš, A., Kaščáková, Z., & Felcan, M., (2020). The impact of ability-enhancing HRM practices on perceived individual performance in IT industry in Slovakia. Central European Journal of Labour Law and Personnel Management, 3(1), 33-45. https://doi.org/10.33382/cejllpm.2020.04.03

Kramoliš, J., & Dobeš, K. (2020). Debt as a financial risk factor in SMEs in the Czech Republic. Equilibrium. Quarterly Journal of Economics and Economic Policy, 15(1), 87-105. https://doi.org/10.24136/eq.2020.005

Ksoll, C., Lilleor, H., B., Lonborg, J., H., & Rasmussen, O., D., (2016). Impact of Village Savings and Loan Associations: Evidence from a cluster randomized trial. Journal of development economics, 120, 70-85. https://doi.org/10.1016/j.jdeveco.2015.12.003

Lazikova, J., Bandlerova, A., Rohacikova, O., Schwarcz, P., & Rumanovska, L. (2018). Regional Disparities of Small and Medium Enterprises in Slovakia. Acta Polytechnica Hungarica, Vol. 15, No. 8, pp. 227-246. https://doi.org/10.12700/APH.15.8.2018.8.12

Mayorova, T., Domzal, Z., Gernego, I., & Dyba, O., (2019). High-technology investments as a driver of rural productivity. Management theory and studies for rural business and infrastructure development. 41(1), 25-32. https://doi.org/10.15544/mts.2019.03

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Mészáros, M., & Divékyová, K. (2019). Immediate termination of employment relationship by the employer. Central European Journal of Labour Law and Personnel Management, 2(2), 33-43. ISSN 2644-4917. https://doi.org/10.33382/cejllpm.2019.03.03

Milone, P. & Ventura, F. (2019). New generation farmers: Rediscovering the peasantry, Journal of Rural Studies 65, pp. 43–52. DOI: https://doi.org/10.1016/j.jrurstud.2018.12.009

Mura, L., & Kajzar, P. (2019). Small Businesses in Cultural Tourism in a Central European Country. Journal of Tourism and Services, 10(19), 40-54. https://doi.org/10.29036/jots.v10i19.110 ISSN 1804-5650

Mura, L., Marchevska, M., & Dubravska, M. (2018). Slovak Retail Business Across Panel Regression Model. Marketing and Management of Innovations, 4, pp. 203-211. ISSN 2227-671

Novák, J., & Netrdová, P. (2011): Prostorové vzorce sociálně-ekonomické diferenciace obcí v České republice. Sociologický časopis, 47(4), pp. 717–744. ISSN 0038-0288 (Print) ISSN 2336-128X (Online)

Okanazu, O.O., Madu, M.A., Igboke, S. A. (2019). A recipe for efficient and corrupt free public sector. Central European Journal of Labour Law and Personnel Management, 2(1), 29-46. https://doi.org/10.33382/cejllpm.2019.02.03

Orynbassarova, Y., Abzalbek, E., Pritvorova, T., Petrenko, Y. 2019. Regional and product profile of post-industrial services in the economy of Kazakhstan. Insights into Regional Development, 1(4), 343-355. https://doi.org/10.9770/ird.2019.1.4(5)

Ouředníček, M., Špačková, P., & Feřtrová, M. (2011). Změny sociálního prostředí a kvality života v depopulačních regionech České republiky. Sociologický časopis/Czech Sociological Review, 47(4), 777-803. ISSN 0038-0288 (Print)
ISSN 2336-128X (Online)

Ouředníček, M., & Temelová, J. (2011): Nové sociálně prostorové nerovnosti, lokální rozvoj a kvalita života. Sociologický časopis/Czech Sociological Review, 47(4)pp. 625-631. ISSN 0038-0288(Print) ISSN 2336-128X (Online)

Ouředníček, M., Temelová, J., & Pospíšilová, L. (2011). eds. Atlas sociálně prostorové diferenciace České republiky. Nakladatelství Karolinum, Praha, 137 p. ISBN 9788024618890

Pastusiak R., Jasiniak M., Soliwoda M., & Stawska J. (2017). What may determine off-farm income? A review. Agric. Econ. – Czech, 63: 380-391. https://doi.org/10.17221/123/2016-AGRICECON

Perlín, R., & Šimčíková, A. (2008). Criteria of a successful rural municipality. Europa XXI, 17, pp. 29–43. ISSN 1429-7132
Perlín, R., Kučerová, S., & Kučera, Z. (2010): Typologie venkovského prostoru Česka. Geografie, 115(2) 161–187. ISSN 1212-0014 (Print) ISSN 2571-421X (Online)

Rajnoha, R., Korauš, A. & Dobrovič, J. (2017). Information systems for sustainable performance of organizations, Journal of Security and Sustainability Issues, 7(1), 167-179. https://doi.org/10.9770/jssi.2017.7.1(14)

Rak, R, & Zrubak, R.. (2012). Project eCALL – Car in Emergency Situation. 7th Scientific International Conference Crisis Management: Enviremental Protection of Population – Conference Proceedings. Edited by Horak, R; Juricek, L; Schwarz, R. pp. 251-258, Proceedings paper, ISBN 978-80-86710-57-0.

Razvanta, F., (2019). Conceptual framework for rural business models. Proceedings of the international conference on business excellence. 13(1), 1130-1139. https://doi.org/10.2478/picbe-2019-0099

Seilerová, M. (2019). The Consequences of Psychosocial Risks in the Workplace in Legal Context. Central European Journal of Labour Law and Personnel Management, 2(1), 47-60. https://doi.org/10.33382/cejllpm.2019.02.04

Selivanova-Fyodorova, N., Komarova, V., Lonska, J, Mietule, I. (2019). Differentiation of internal regions in the EU countries. Insights into Regional Development, 1(4), 370-384. https://doi.org/10.9770/ird.2019.1.4(7)

Singgalen, Y.A., Sasongko, G., Wiloso, P.G. (2019). Community participation in regional tourism development: a case study in North Halmahera Regency - Indonesia. Insights into Regional Development, 1(4), 318-332. https://doi.org/10.9770/ird.2019.1.4(3)

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Skála, V. (2017). Vliv sociálního kapitálu na rozvojový potenciál venkovských obcí. Acta Politologica, FSV UK Praha, pp. 40-56. ISSN 1803-8220 (on-line) | ISSN 1804-1302 (print)

Sobczyk, W. (2014). Sustainable Development of Rural Areas: Problems of sustainable development, https://ssrn.com/abstract=2387299

Sobczyk, W. (2014). Sustainable Development of Rural Areas: Problems of sustainable development, https://ssrn.com/abstract=2387299

Steiner, A., & Teasdale, S., (2019). Unlocking the potential of rural social enterprise. Journal of rural studies. 70, 144-154. https://doi.org/10.1016/j.jrurstud.2017.12.021

Straka, J., & Tuzova, M., (2016). Factors Affecting Development of Rural Areas in the Czech Republic: A Literature Review. 19th international conference enterprise and competitive environment, 220, 496-505. https://doi.org/10.1016/j.sbspro.2016.05.525

Štefko, M. (2019). Notice for reasons of redundancy as a measure for discrimination on grounds of age. Central European Journal of Labour Law and Personnel Management, 1(1), 61-73. https://doi.org/10.33382/cejllpm.2019.02.05

Vlacseková, D. (2019). Comparative analysis of motivation of civil servants and public servants in the local state administration – case study of Slovakia. Central European Journal of Labour Law and Personnel Management, 2(1), 74-93. https://doi.org/10.33382/cejllpm.2019.02.06

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Petra PÁRTLOVÁ is a research assistant at the Department of Management of the at the Institute of Technology and Business in České Budějovice. Her research deals with the issues of corporate management, focusing on small and medium-sized enterprises (smes) and regional policy. She deals with the issues of external environment and sustainability and profit of small and medium sized businesses in the czech republic. Within the major changes, modifications of the corporate architecture are proposed. It is a fact that the production and economic and social base for smes is a rural area that is the subject of research within the territorial regionalism.
ORCID ID: https://orcid.org/0000-0003-2404-6073

Zuzana DVOŘÁKOVÁ LÍŠKOVÁ works as a lecturer in the Department of Regional Development. In her research and pedagogic activity is involved in the topic of human impacts on the landscape in terms of ecological and socio-economic point of view. She also deals with the issue of sustainable regional development, possibilities of brownfields regeneration and strategic and tactical documents for public administration.
ORCID ID: https://orcid.org/0000-0003-1788-6808

Miroslav FELCAN is an associate professor at Academy of the Police Force in Bratislava, Slovak Republic. Research interests: administrative law, tax law, financial law, finance security, economic frauds, financial frauds, sustainability.
ORCID ID: https://orcid.org/0000-0002-4274-4417

Jarmila STRAKOVÁ serves as associate professor and Deputy Head of the Managment Department at the Technical and Economic Institution in České Budějovice. The research work of the author focuses on the issues of strategic management of enterprises, especially on the analysis of the business environment and the value of the enterprise potential.
ORCID ID: https://orcid.org/0000-0002-3048-3467

Jan VÁCHAL is professor and head of the Department of Management at the Institute of Technology and Business in České Budějovice. His research focuses on the issues of corporate strategy, environment of enterprises and production potential, in different sectors of national economy. In a long-term, he deals with energy-mass flows in the landscape, issues of landscape engineering and the determination of production and environmental functions in natural and cultural ecosystems. Outputs from the research are implemented into economic analyses, economic-energy balances, and financial sector support.
ORCID ID: https://orcid.org/0000-0003-0627-1517

Jozef POLOMSKÝ
Jozef Polomský is the director of Vector Invest s.r.o., a leader in the processing of eggs, and a manufacturer of dietetic products of egg origin. The company trades in EU markets and exports products to third countries. He is the author and co-author of several patents and utility models in the field of dietetic products. Mr Polomsky also actively works in the field of optimization of internal company processes, improvement of logistics, modernization of the structures of small businesses, their internationalization and internal innovation.
ORCID ID: https://orcid.org/0000-0001-7994-2372

**ENTREPRENEURSHIP AND
SUSTAINABILITY CENTER**

Publisher
http://jssidoi.org/esc/home

THE SCOPE OF LEGAL EXPECTATIONS FROM BUSINESS IN HUMAN RIGHTS: CARROT OR STICK?

Lyra Jakulevičienė [1], Dovilė Gailiūtė-Janušonė [2]

[1,2]*Mykolas Romeris Law School, Mykolas Romeris University, Ateities Str. 20, 08303 Vilnius, Lithuania*

E-mail: [1]lyra.jakuleviciene@mruni.eu; [2]dgailiute@mruni.eu

Abstract. Although not all businesses acknowledge it, most face issues of human rights in their business operations or relationships. These issues can have positive or negative impacts, whether for their employees, consumers, or communities. In times of crisis, the issues of human rights in business are even more acute − as the COVID-19 pandemic has demonstrated, already having a dramatic impact on people across many supply chains. While the perception that states are responsible for human rights broadly prevails, businesses increasingly face growing expectations to assess, address, and remedy the negative impacts of their activities. Furthermore, developments in the past decade demonstrate the evolution of such expectations into legal requirements and mandatory regulation. States have employed various tools to influence business activities in this field, ranging from soft law to legal requirements both at national and international levels. This article analyses the main European trends of such an evolution within the selected areas of due diligence, non-financial reporting, and investment, and delves into recent developments from the perspective of benefits for business. It explores if the perceived benefits for businesses exclusively serve as a 'stick' that requires compliance, or whether they might extend beyond this.

1. Introduction

Most, if not all, businesses face human rights challenges in their operations and business relationships (Baglayan, Landau, McVey, & Wodajo 2018, p. 12), but not all of them recognize these challenges. A recent survey conducted by the European Union (hereafter – EU) Fundamental Rights Agency highlighted that most human rights violations occur in the context of environmental rights, labour relations, and the field of non-discrimination (Fundamental Rights Agency 2019). Surprisingly, these are among the areas (in particular health, safety, consumer protection, labour, non-discrimination, and the environmental field) where extensive legal requirements

under national law exist for businesses (at least in the European region), and these rules are amongst the most protective and effective in the world (European Commission 2015). This contradiction demonstrates that businesses are still not eager to embark on issues of human rights, the reasons behind which might include: the additional administrative burden or perception thereof; the perception of human rights as being far from the business' main goal – profit; limited means of enforcement from the state; low awareness, etc. No less important is the notion that businesses frequently perceive the protection of human rights as being the sole responsibility of the state.

Indeed, states have traditionally been viewed as those responsible for human rights, mainly due to the fact that, firstly, international human rights treaties are signed by states. In other areas of law, such as environmental civil liability, treaties already aim to directly regulate corporations (Bernaz, 2020). Secondly, international and European bodies have, over the years, developed case-law that provides for a state's obligations to protect human rights, covering not only its own actions or inactivity but, through the concept of positive obligations, also extending to ensure that human rights are not violated by private subjects or legal entities, including companies (*Wilson, National Union of Journalists and Others v. the United Kingdom* 2002, paras. 41, 48; *Moreno Gómez v. Spain*, 2004, paras. 55, 62; *Cabal and Pasini Bertran v. Australia* 2003, para. 7.2, etc.). This includes the human rights of individuals in the value chains of businesses supplying goods and services to the state, (Maastricht Guidelines 1997, para. 18; United Nations Committee on Economic, Social and Cultural Rights 2012).

As states are not in direct control of the activities of private companies, they face the challenge of ensuring observance of human rights in the private sphere related to business. For this purpose, they have employed various tools to influence the activities of businesses in this field, ranging from soft law to legal requirements both at the national and international level. At the national level, states have adopted various legislative requirements with regard to labour standards, non-discrimination, privacy protection, and others, and promoted so-called 'responsible' businesses through various incentives. In last decade, a number of states have introduced National Action Plans on Business and Human Rights (hereafter – the NAPs), which include expectations placed on businesses to embed human rights in their policies, practices, and reporting. For instance, Lithuania adopted its first NAP in 2014 as a soft law instrument (Lithuania's Action Plan 2014), and has been elaborating on a new one in 2020 – this time likely to be approved as a normative act. Also, the development of various other soft law instruments on due diligence, supply chain management, public procurement and the like have intensified, and in certain cases evolved into, legislative initiatives binding business entities.

At the same time, some authors argue that businesses have direct obligations under existing international law, although these are limited and wholly dependent on the state's further actions of implementation and enforcement through the concept of the partial legal personality of businesses in international law (Latorre 2020, pp. 56-83). Moreover, the European Court of Human Rights tends, in some cases, to directly attribute duties to protect human rights to non-state actors (*Von Hannover v. Germany* 2004). However, up until now one cannot find any reference to the direct international human rights obligations of business entities in international law (De Brabandere 2018; Šaltinytė 2020, p. 226). Instead, businesses have a 'responsibility to respect' human rights – that is, to 'do no harm' (Morris 2020, p. 15). At the international level, soft law instruments, such as the United Nations (UN) Guiding Principles on Business and Human Rights (hereafter – UNGPs, UN Guiding Principles), have not yet turned into legal requirements for businesses, despite recent work within the UN Human Rights Council on the Draft Convention on Business and Human Rights.

Whichever concept we would follow, it is undeniable that the expectations placed on businesses to observe human rights have been increasing in recent years. In times of crisis, issues of human rights in business are even more

acute, as the COVID-19 pandemic has already had a dramatic impact on people in many supply chains (UN Working Group on Business and Human Rights 2020). Alas, what is the scope of those legal expectations, and what impact will such expectations have on business activities? Can businesses benefit from embedding human rights into their activities, or only ensure compliance with emerging legal regulations? This article investigates these questions. The aim of this article is to analyse how the most recent European legal developments related to upholding human rights in business activities shape the scope of expectations that businesses might face now and in the near future. This aim is composed of two objectives: a) to analyse the most recent European tendencies in creating legal expectations placed on businesses, alongside emerging legal requirements; b) to examine whether emerging regulation and legal expectations to embed human rights create benefits for businesses that extend beyond formal regulatory compliance.

The dialogue between business and human rights mainly concerns assessing the impacts that businesses have on human rights. This includes risks created through businesses' own activities or as a result of their business relationships, including suppliers they outsource to (UN Guiding Principles, principle 18). However, the term is also closely related to corporate social responsibility (hereafter – CSR), which is voluntary in nature. Conversely, the concept of business and human rights largely evolves from the mandatory commitments of states under international law, but also the developing legal expectations of states, stakeholders (e.g. investors), or society at large for businesses to observe standards of human rights. The concept of corporate social responsibility thematically overlaps with the notion of business and human rights, but is much broader in scope than human rights alone (Čertanec 2019, p. 109; for a detailed description of the relationship between the concepts, see European Commission 2019). The issues analysed in this article are widely explored by various authors (Ramasastry 2015; Bernaz 2017; McCorquodale, Smit, Neely, & Brooks 2017; Buhmann & Wettstein, 2017; also see the works of human rights experts such as John Gerard Ruggie, Michael K. Addo, Jena Martin, and others) who mostly focus on particular aspects of this topic, while this paper aims to place businesses in a broader context of trends, and examine whether it is beneficial for businesses to go further than simply abiding by rising requirements. It considers the trends of recent years, and examines the setbacks and benefits of processes where expectations have turned, or are beginning to turn, into legal requirements. From the methodological point of view, this article is built around an analysis of recent legislative and jurisprudential developments at the EU and national levels, and relies on doctrine, the reports of international organisations, and empirical data from various sources. The first part of the article examines the processes in selected areas where the evidence of change between expectations and legal requirements placed on business regarding human rights could be found, and the consequences of these developments where it is possible to trace a record of them. Secondly, the authors provide insights into some of the benefits of these developments by using current examples and exploring whether they add tangible value for businesses or serve only as beneficial in terms of regulatory compliance.

2. Between lawful expectations and legal requirements

At the European level, recent trends demonstrate the development of legal requirements in the area of businesses and human rights with regard, but not limited, to: due diligence, non-financial reporting, and investment. Firstly, the legal environment in Europe has changed since 2011, when 'human rights due diligence' was formally conceptualized in the UN Guiding Principles that called on companies to identify, prevent, mitigate, and account for how they address their impacts on human rights (Principle 15(b)). However, there has been little effectiveness observed in the voluntary commitments regarding human rights compliance in the supply chain. For instance, according to a recent study in the German government report of July 2020, companies do not voluntarily do enough for human rights. It also states that not even a fifth of the companies surveyed voluntarily abide by human rights standards (Aryobsei & Scherb 2020).

At the EU level, the requirement of due diligence has been developing in the direction of emerging legal regulation. Having started from a sectorial approach in 2010 and 2017 by including the requirement for due diligence as mandatory one (Regulation (EU) 995/2010, Regulation (EU) 2017/821), the EU has a strong commitment to expand it to other sectors. The European Council Conclusions on the EU priorities in the UN human rights forums adopted on 17 February 2020 highlight the focus on due diligence initiatives, among other priorities. As will be demonstrated later, the trend for mandatory due diligence follows also from the financial sector and the expectations of investors. On 29 April 2020, the European Commission confirmed its commitment to introduce mandatory assessment of the impacts of business activities and supply chains on the environment and human rights (European Commission 2020). The Commission will prepare draft legislation by 2021. These developments are in parallel to national ones, where some legislators establish a legally binding obligation for parent companies to identify and prevent adverse human rights and environmental impacts resulting from their own activities or those of companies that they control, and from the activities of their subcontractors and suppliers with whom they have an established commercial relationship. France was the first country to adopt the due diligence requirement in its Duty of Vigilance Law in 2017, followed by the Netherlands with the Child Labour Due Diligence Law in 2019, and various other governments are now considering legislative proposals (e.g. Austria, Luxembourg) (Business & Human Rights Resource Centre, n.d.). In Switzerland, the Responsible Business initiative has been launched and its counterproposal, the parliamentary initiative for mandatory human rights due diligence, was approved on 5 June 2020 (Business & Human Rights Resource Centre 2020b). However, as the members of the Responsible Business Initiative rejected this counter-proposal, there will be a public referendum in late 2020 on this issue (European Coalition for Corporate Justice 2020). Germany will soon be introducing the Supply Chain Act, obliging companies to comply with human rights and environmental standards by law (Schenk, Thorhauer, et al. 2020).

At the same time, research demonstrates that the commonly used tools of due diligence are not very effective at improving respect for human rights (see the research of Locke 2013; Barrientos & Smith 2007; Lindholm, Egels-Zandén, & Rudén 2016; Curley 2020; Alliance for Corporate Transparency 2019, pp. 98–99). Among the reasons for this are: the notion that due diligence is misunderstood by many companies as a mere reporting obligation (Gregor & Houston 2020); and the idea that many companies do not have the necessary expertise to implement effective human rights due diligence, whilst the right expertise can also be difficult to find externally (UN Working Group on Business and Human Rights 2018). Another reason that has been identified is the growing complexity of corporate structures, which complicates the implementation of due diligence tools not only in the parent/controlling company, but within its business relationships as well (CIDSE 2013, p. 3). Moreover, states are not always willing or able to meet their duty to protect (CIDSE 2018, p. 5). Therefore, the development of new legal requirements at the EU level should consider and address these drawbacks of the new legislation, in particular by improving: understanding of the value of the requirements; the relationship between materiality and reporting (i.e. what exactly the companies do); and enforcement.

Another trend of rising expectations from businesses is related to non-financial reporting, where mandatory requirements have existed since 2014 and are further developing. EU Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 – amending Directive 2013/34/EU, as regards the disclosure of non-financial and diversity information by certain large undertakings and groups (also called the EU Non-Financial Reporting Directive) – embodied the duty of large companies from 2018 onwards to annually publish information on non-financial issues, including on the risk of negative impacts on human rights which are directly related to the activities, products, services, and business relations of the company. However, one recent study demonstrated that, of the 1,000 companies assessed, almost 57% report on risks related to human rights, but only

around 4% report on concrete measures in this regard (Alliance for Corporate Transparency 2019, p. 70). According to the authors, general human rights reporting requirements are not an effective tool for ensuring the disclosure of information that can help to assess a company's management of the individual risks of human rights impacts, and by extension of whether its business conduct is responsible (Alliance for Corporate Transparency 2019, p. 70). The European Commission announced in its Communication on the European Green Deal in 2019 that companies and financial institutions should improve their disclosure of non-financial information, and it plans to revise the Non-Financial Reporting Directive in 2020 as part of a strategy to strengthen the foundations for sustainable investment. This demonstrates that, despite the existing legal requirements, the users of this information (mainly investors and civil society organisations) are demanding more and better information from companies about their social and environmental performance and impacts. This also reflects global trends, with a wide variety of different organisations and stakeholders calling for consideration of a new regulatory approach to non-financial reporting (European Commission 2020).

The third area of development for human rights expectations placed on businesses is in the financial sector. There have been developments both in terms of expectations from investors and the requirements that have been rising for clients in the financial sector. Since the primary obligation to observe and ensure respect for human rights lies with the host state, foreign investors cannot be said to be the direct holders of human rights obligations under international law. The obligations foreign investors have are essentially based on domestic civil or criminal law (De Brabandere 2018, p. 5). This is in line with the primary objectives of traditional investment treaties: to grant rights to foreign investors rather than impose obligations on them (Dubin 2018). Investment tribunals, so far, have also contested the notion that dealing with human rights issues in investment disputes falls within their jurisdiction (De Brabandere 2018, p. 9). For example, when Argentina filed a counterclaim regarding the investor's breach of the human right to water in the *Urbaser v. Argentina* case, the tribunal concluded that Argentina's claim could not be accepted, as the human right to water created obligations for states only (*Urbaser and Consorcio de Aguas Bilbao v. Argentina* 2016, para. 1210). At the same time, the arbitrators considered that 'the situation would be different in case an obligation to abstain, like a prohibition to commit acts violating human rights[,] would be at stake. Such an obligation can be of immediate application, not only upon States, but equally to individuals and other private parties' (para. 1210). Despite the traditional objectives of investment treaties, there have been some examples where indirect clauses were provided in investment treaties through CSR as a self-regulating technique (Canada–EU Comprehensive Economic Trade Agreement; Dubin 2018). The UN Conference on Trade and Development (UNCTAD) World Investment Report 2018 notes that most of today's new international investment agreements include sustainable-development-oriented reform elements, and finds remarkable differences in these agreements between 2000 and 2017 in that the newer ones explicitly recognize health, safety, and environment standards (UNCTAD, 2018). In its 2020 report, the UNCTAD confirms that recent treaties increasingly incorporate aspects of sustainability (UNCTAD 2020, p. 19). Although human rights obligations for foreign investors are explicitly included in investment treaties only rarely, because the primary objective of traditional investment treaties is to grant rights to foreign investors rather than impose obligations on them, there are several recent examples of investment treaties containing clauses which refer to the obligations of foreign investors in the area of human rights (De Brabandere 2018, p. 10). For instance, the Intra–MERCOSUR Agreement contains 'a "best efforts" obligation for investors to respect the human rights of the people involved in investment activities, and to promote the building of local capacity and the development of human capital' (Baglayan et al. 2018, p. 29). Other examples include the 1990 EC–Argentina cooperation agreement, the 2008 EU–Cariforum agreement, and the Cotonou Agreement (Bartels 2014). However, direct clauses in investment treaties often use weak language or are relatively weak in substance (Dubin 2018). For instance, Article 24 of the Pan-African Investment Code uses conditional verbs ('should') to encourage investors to comply with internationally recognized human rights laws (African Union Commission 2016). At the same time, one can

conclude that the emerging provisions in investment treaties reflect a new approach that might develop in the future. Furthermore, investment treaties may deny protection to foreign investors of the other party that have engaged in conduct leading to a violation of human rights (UN Committee on Economic, Social and Cultural Rights 2017, para. 50).

Besides the developing requirements for investors on human rights, they themselves increasingly direct their investments into activities that are not harmful and that require companies to prevent, mitigate, or remedy impacts where they occur (Alliance for Corporate Transparency 2019, p. 71). Thus, while more investors are considering sustainability and long-term options, investor scrutiny is increasing in capital allocation decisions (Baglayan et al. 2018, p. 10). In September 2019, the Principles of Responsible Banking were adopted at the global level by one third of banks worldwide, which, among banks' internal commitments to evaluate and manage their impacts on people and environment, also call for banks to encourage sustainable practices among their clients and customers (UN Environment Programme Finance Initiative 2019, Principle 3). Moreover, in April 2020, over 100 investors called for the responsibility of economic actors to respect human rights, and that human rights due diligence is a key requirement for companies to meet this responsibility. They expressed expectations that governments adopt binding human rights due diligence requirements where corporate voluntary action leaves gaps in human rights protection (Business & Human Rights Resource Centre 2020a). Meanwhile, the EU is progressively considering requirements for the financial system that support the EU's climate and sustainable development agenda. In 2018, the European Commission adopted the Action Plan: Financing Sustainable Growth, which provided a roadmap by setting out the role of finance in achieving a well-performing economy that delivers on environmental and social goals. It also called for the development of a taxonomy of sustainable activities, which the banking sector should foster and deploy as the basis for a future EU taxonomy in legislation (UN Environment Programme Finance Initiative 2019, p. 4).

In conclusion, the evolution of expectations towards legal regulation for businesses in the areas of human rights analysed range from soft law, to partial regulation (mainly reflected by the sectorial or business-type approach), to full regulation (mandatory provisions for all). As can be seen from the Figure 1, full regulation is still not achieved in the areas analysed. While human rights due diligence is most advanced in terms of legal regulation, so far mandatory requirements have not attained a wide recognition at the national (few examples only) or the EU levels. At the same time, considering the EU political commitments, the prospective regulation in this area is most realistic (EU level).
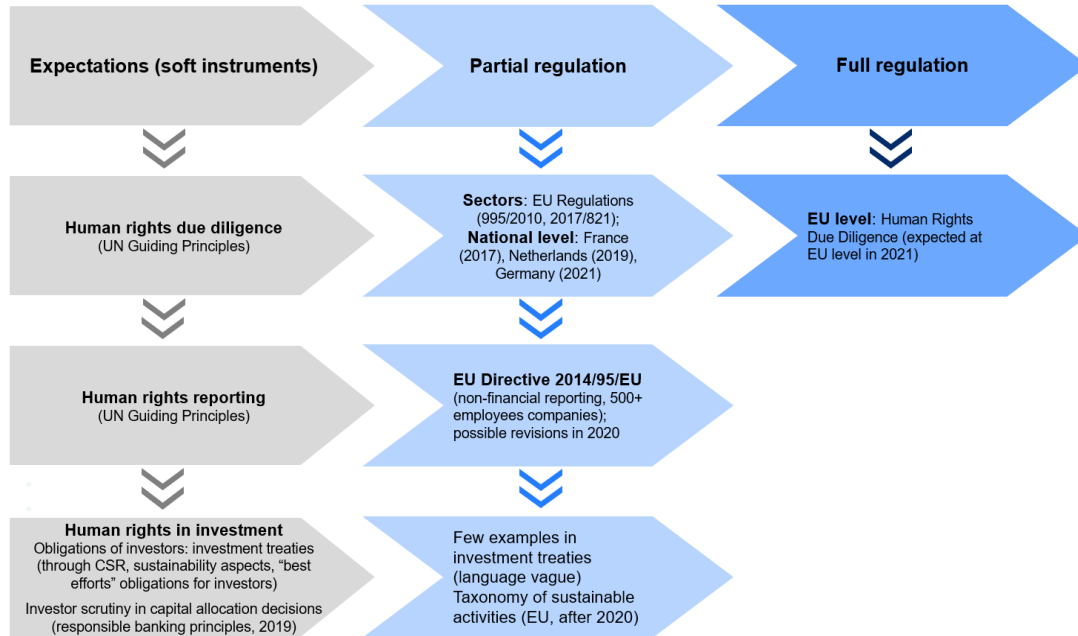
Figure 1. The evolution of expectations into regulation in the areas of human rights due diligence, reporting, and investment.
Source: authors

3. The benefits of integrating human rights into businesses policies and practice

The benefits for businesses stemming from the integration of human rights practices have been extensively documented and analysed (Parella 2019; Bonfanti 2019 and others), and were consolidated in the 'Good Business: The Economic Case for Protecting Human Rights' report in 2018 (hereinafter – the Good Business Report; Baglayan et al.). This report was a first step towards building more evidence-based research on the so-called 'business case' for corporate human rights responsibility, and it summarised the key economic drivers for businesses in human rights in the four areas illustrated in Figure 2.

Figure 2. Key economic drivers for businesses in respecting human rights.
Source: Baglayan et al., 2018, p. 17

Since this report, there have been a number of developments that highlight the evidence of benefits for businesses – those of an economic nature in particular. The report highlighted two dimensions of benefits: a) the reduction of cost and risk (worker loyalty and productivity and reducing risks of litigation and to reputation); b) competitive advantage (procurement and investment).

The issue of business and human rights is sometimes perceived as an issue relevant for multinational companies only. For instance, some companies claim that they operate in the EU, where labour regulations are overemphasized and there is no issue of human rights in this sphere in the region (based on the authors' own encounters with business associations and companies in Lithuania). This is not true, as each company, large or small, is routinely faced with human rights issues. First of all, companies increasingly invest in foreign states where human rights and corruption concerns exist; thus, it might be useful to have due diligence procedures in order to assess the risks involved. These measures allow businesses to assess and manage potential risks in a timely manner, and to ensure the preservation of their reputation in risk markets. The formalizing of a common piece of human rights due diligence legislation at the European level, as we have seen in part I of this paper, could come with an additional benefit. It would level the playing field – or at least ensure that all businesses incur the same costs with regards to reinforcing their management systems and practices. This, in turn would create legal certainty. The resulting unity is expected to help corporations gain the necessary traction and leverage to address

systemic issues across their supply chains (Dillon 2020). Secondly, due diligence could help to avoid or minimize legal suits. A review of 151 litigation cases showed: a rapidly increasing trend in the frequency of these lawsuits; steadily rising direct financial costs; and that companies are increasingly opting for out-of-court settlements, despite the substantial expense associated (Baglayan et al. 2018, p. 10). Recently, a few important judgments on human rights issues in business have been issued by the courts in Europe. The judgment of the United Kingdom (UK) Supreme Court of 10 April 2019 in *Vedanta Resources PLC v. Lungowe* confirmed that a parent company can be liable for the operations of its subsidiary in the English courts, despite the fact that harm to the local population by polluting water occurred in Zambia. Thus, there is the possibility for non-UK claimants to bring claims against them in English courts (*Vedanta Resources Plc and Konkola Copper Mines Plc v. Lungowe and Others,* 2019, paras. 53–54). On 1 May 2019, the Dutch court ruled in *Kiobel v. Shell* that it has the jurisdiction to determine whether Royal Dutch Shell was complicit in the 1995 Nigerian government's execution of the applicants' husbands—part of the Ogoni 9 activists—who contested Shell's operations and the Nigerian government over the effects of oil pollution (para. 4.23). Differently from previous lawsuits in the United States on the same subject based on tort law, this lawsuit aims at engaging the Shell concern directly in a lawsuit on the infringement of the human rights included in the African Charter on Human and Peoples Rights (ACHPR) and the Nigerian constitution. The trend is that companies now face an increasing risk of legal action and the economic costs it entails, because corporate human rights litigation is costly in terms of finance, reputation, and time (Baglayan et al. 2018, p. 41). In 2018, the Good Business Report identified five types of costs related to human rights lawsuits: financial cost; out-of-court settlement; information-disclosure cost; reputational damage; and potential stock-price decline. As to reputational damage, bad publicity subsequent to a lawsuit often damages the public image of the firm regardless of the final ruling (Baglayan et al. 2018, p. 53).

Companies that export goods and services need to be aware that there are developments in the field of export credits, which add further economic incentives or disincentives for respecting or not respecting human rights. States may refuse access to export credits and other forms of state support in case of human rights issues, thus compliance with requirements may ensure advantage for responsible companies (UN Committee on Economic, Social and Cultural Rights, 2017, para. 15). Although little research has been conducted on the effects of these opportunities, the risks of non-compliance are evident (Baglayan et al. 2018, p. 10).

Those companies that do not invest and not operate in risk countries might be procuring raw materials, products, or services in its global supply chain, thus human rights prevention measures assist in evaluating and managing risks in that chain and in ensuring the reputation of the company. Such risks may include legal (incurring liability for human rights abuses), financial (costs associated with delays in contract delivery, re-running procurement exercises, or remediating harm to victims), or reputational risks. However, if addressed effectively, such risks may become opportunities (Morris 2020, p. 10).

Apart from avoiding the negative consequences of not observing human rights, a company's pro-active role in embedding human rights in its business can lead to additional advantages, including through the economic incentives that public agencies can employ. This is particularly true for companies that aim to attract investment, participate in stock exchanges, and obtain funding from national and international funds, as they are viewed more favourably when they have human rights policies and implement concrete measures thereon (Baglayan et al. 2018 pp. 29–40). Investors assess such companies more positively when they implement human rights measures in business activities, as confirmed by the Responsible Banking Principles, signed by banks in September 2019, which demonstrates their commitment to sustainable business − also including human rights (UN Environment Programme Finance Initiative 2019). Inversely, being seen to create problems for communities or the environment can repel investors. Among recent examples of this effect is the Grigeo company in Lithuania, the

share price of which dropped by almost 30 percent following environmental damage caused to the local population as a result of allegedly negligent behaviour with water waste management at the beginning of 2020 (Blekaitis 2020). Furthermore, states also aim to promote responsible companies. For instance, the Swedish government publishes examples of responsible companies, as investors more favourably regard the investment climate in such countries (Sustainable Business in Sweden, n.d.).

As the utilisation of human rights standards in public procurement contracts has become common in countries implementing the UNGPs (Baglayan et al. 2018, p. 10), companies may also possess advantages in national and international tenders, where those capable of demonstrating performance as per high social standards are more favourably considered. This may provide a competitive advantage, in particular within social and sustainable public procurement processes. Increasingly, governments are using economic leverage as a tool to enhance compliance with human rights, as well as environmental and labour standards, by conditioning conveyance of economic benefits upon corporations' performance in these areas (p. 29). EU procurement laws contain an overarching 'social clause' that requires EU Member States to take appropriate measures to ensure, in the performance of a contract, that economic operators comply with the applicable environmental, social, and labour law obligations, including ILO Conventions (Article 18 of the Directive 2014/24/EU). More specifically, they cover: the requirement to exclude bidders that have been convicted of child labour or other forms of trafficking in human beings (Article 57(1)); the possibility to exclude bidders due to non-compliance with environmental, social, or labour law obligations (Article 57(4)); and, for the first time, social considerations in the awarding phase. Article 69 requires contracting authorities to reject tenders that are abnormally low due to poor human rights standards, in case the supplier is unable to satisfactorily account for the low level of the price (Morris 2020, p. 30). These developments are supported at the national level, where more and more states are now adopting national action plans on sustainable public procurement where the social element is informed by human rights (Morris 2020, p. 34−35). For example, Belgium's Public Procurement Act of 2017 requires that suppliers and sub-contractors comply with environmental, social, and labour laws, and failure to comply with this requirement may serve as a ground for exclusion. Switzerland's updated National Action Plan 2020–2023 on business and human rights refers to the Federal Act on Public Procurement, which envisages that the contracting authority may require bidders to comply with other core international labour standards, provide proof of compliance, and agree to audits (Morris 2020, p. 31). Companies that have already embedded these practices would find themselves at a competitive advantage in terms of meeting such requirements. Incentives are also developing at the municipal level. In 2020, the City of Malmö in Sweden introduced a scheme to analyse and prioritise procurement exercises with the greatest environmental and social impact. For example, a procurement exercise related to transport will achieve a higher rating on the list of prioritised procurement exercises if it contributes to realising this goal. This scheme takes into consideration a procurement's economic value as well as its scope for positive impact. Where leverage to influence the market is higher, projects are also ranked higher on the list of prioritised procurement exercises (Morris 2020, p. 70). On the other hand, if the state does not recognize business efforts in public procurement exercises, it may discourage businesses from sustaining such practices (Morris 2020, p. 10).

If directly related to core business activities, the integration of human rights principles into business policy, practice, and communication, could contribute to opening new business opportunities (e.g. expanding the range of clients by including vulnerable populations if the products and services are made more accessible). Also, a company that respects human rights internally and externally can profit from a more loyal, engaged, and productive workforce, as well as avoid supply chain disruption and employee-based litigation claims (Baglayan et al. 2018, p. 21). This particularly supports business resilience in case of crisis. For instance, those companies that earlier provided opportunities for a better work−life balance to their employees by allowing for the possibility of remote working were able to adapt much more easily and quickly to the changing labour conditions brought about

by the arrival of the COVID-19 pandemic, and the resulting quarantine. Surveys provide evidence that job loyalty rises as businesses address employee needs, from diversity and inclusion to sustainability and reskilling (Deloitte 2020). Apart from internal human rights issues, research confirms that inclusion and engagement with affected communities is not only a matter of mitigating risk, but can also be financially rewarding (Baglayan et al. 2018, p. 27).

4. Conclusions

Although researchers and international organisations acknowledge that voluntary commitments by businesses in the field of human rights do not yield effective results, the emerging binding requirements have also demonstrated drawbacks in achieving their aims. So far the existing legal requirements have had a limited effect on human rights compliance, and have served more as a 'stick' rather than a perceived 'carrot' that brings benefits for businesses.

However, the legal regulation on business and human rights needs to be viewed as something that creates opportunities—not only constraints—for businesses. The full use of such benefits can only be possible if states demonstrate strong leverage commitments to human rights requirements placed on business, for example in public procurement and other incentives, and create a positive environment for business action.

While human rights due diligence is most advanced in terms of legal regulation, so far mandatory requirements have not attained wide recognition at the national (few examples only) or the EU levels. At the same time, considering the political commitments of the EU, the prospective regulation in this area is most realistic. Its value would be enhanced both for businesses and for human rights compliance if noted drawbacks are addressed when creating the EU-wide mandatory rules on due diligence. This could include: promoting understanding of the content and the value of the requirements of due diligence, as well as the relationship between materiality and reporting, creating enforcement mechanism and possibly differentiating the requirements for small and large businesses as their capacities differ.

Expectations from companies that are turning into legal requirements − in particular on due diligence, access to capital, and non-financial reporting − are not a threat to business and are reasonable. Expecially, if we consider that ignorance of existing impact on human rights might result in financial, reputational, investor relations, or other risks and costs, such as litigation. Understanding these expectations allows companies to easier navigate the changing business environment, which would otherwise be quite alien to businesses accustomed to the previous landscape.

References

African Union Commission. (2016). *Draft Pan-African Investment Code*. Retrieved from https://au.int/sites/default/files/documents/32844-doc-draft_pan-african_investment_code_december_2016_en.pdf

Alliance for Corporate Transparency. (2019). *Research report 2019: An analysis of the sustainability reports of 1000 companies pursuant to the EU Non-Financial Reporting Directive*. Retrieved from https://www.allianceforcorporatetransparency.org/assets/2019_Research_Report%20_Alliance_for_Corporate_Transparency-7d9802a0c18c9f13017d686481bd2d6c6886fea6d9e9c7a5c3cfafea8a48b1c7.pdf

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Aryobsei, M., & Scherb, M. (15 July 2020). Germany takes a step closer to mandatory human rights supply chain due diligence [Blog post]. *Freshfields Bruckhaus Deringer*. Retrieved from https://sustainability.freshfields.com/post/102gbky/germany-takes-a-step-closer-to-mandatory-human-rights-supply-chain-due-diligence

Baglayan, B., Landau, I., McVey, M. C., & Wodajo, K. (2018). *Good business: The economic case for protecting human rights* [Report]. Retrieved from https://corporatejustice.org/2018_good-business-report.pdf

Barrientos, S. & Smith, S. (2007). Do Workers Benefit from Ethical Trade? Assessing Codes of Labour Practice in Global Production Systems. Third World Quarterly, 28, 713–29. https://doi.org/10.1080/01436590701336580

Bartels, L. (2014). *A model human rights clause for the EU's international trade agreements*. Berlin: German Institute for Human Rights. Retrieved from https://www.institut-fuer-menschenrechte.de/uploads/tx_commerce/Studie_A_Model_Human_Rights_Clause.pdf

Bernaz, N. (2017). *Business and human rights. History, law and policy – Bridging the accountability gap*. London: Routledge.

Bernaz, N. (25 August 2020). The draft UN Treaty on Business and Human Rights: The triumph of realism over idealism [Blog post]. *Business & Human Rights Resource Centre*. Retrieved from https://www.business-humanrights.org/en/the-draft-un-treaty-on-business-and-human-rights-the-triumph-of-realism-over-idealism

Blekaitis, L. (10 January 2020). Atnaujinus prekybą, „Grigeo" akcijų vertė krito beveik 30 proc. [The value of Grigeo shares fell by 30% after resuming trade]. *LRT*. https://www.lrt.lt/naujienos/verslas/4/1132125/atnaujinus-prekyba-grigeo-akciju-verte-krito-beveik-30-proc

Bonfanti, A. (Ed.). (2019). *Business and Human Rights in Europe: International Law Challenges*. London: Routledge.

Buhmann, K., & Wettstein, F. (2017). Business and human rights: Not just another CSR issue? In A. Rasche, M. Morsing, & J. Moon (Eds.), *Corporate social responsibility: Strategy, communication, governance* (pp. 379–404). Cambridge: Cambridge University Press. https://doi.org/10.1017/9781316335529.024

Business & Human Rights Resource Centre. (N.d.) *Towards mandatory human rights due diligence* [Blog]. Retrieved from https://www.business-humanrights.org/en/blog/?opinion_series=3&backdate_after=&backdate_before=&query=

Business & Human Rights Resource Centre. (21 April 2020a). Investors with over US$4.2 trillion call on govts. to introduce mandatory human rights due diligence for companies [Story summary]. Retrieved from https://www.business-humanrights.org/en/latest-news/investors-with-over-us42-trillion-call-on-govts-to-introduce-mandatory-human-rights-due-diligence-for-companies/

Business & Human Rights Resource Centre. (9 June 2020b). Swiss due diligence initiative set for public referendum as Parliament only opts for reporting-centred proposal [Story summary]. Retrieved from https://www.business-humanrights.org/en/latest-news/swiss-due-diligence-initiative-set-for-public-referendum-as-parliament-only-opts-for-reporting-centred-proposal/

CIDSE. (2013). *Human rights due diligence: Policy measures for effective implementation*. Brussels: CIDSE. Retrieved from https://media.business-humanrights.org/media/documents/files/documents/HRDD_EN_Final.pdf

Cabal and Pasini Bertran v. Australia, Communication 1020/2001, UN Doc. CCPR/C/78/D/1020/2001, 19 September 2003.

Curley, M. (3 July 2020). Human rights due diligence: Making it mandatory – and effective [Blog post]. *EUIdeas*. Retrieved from https://euideas.eui.eu/2020/07/03/human-rights-due-diligence-making-it-mandatory-and-effective/

Čertanec, A. (2019). The connection between corporate social responsibility and corporate respect for human rights. *DANUBE: Law, Economics and Social Issues Review*, 10(2), 103–127. https://doi.org/10.2478/danb-2019-0006

De Brabandere, E. (26 March 2018). Human rights and international investment law. *Grotius Centre Working Paper Series*, No. 2018/075-HRL. Retrieved from https://ssrn.com/abstract=3149387

Deloitte. (2020). *The Deloitte Global Millennial Survey 2020: Resilient generations hold the key to creating a 'better normal'* [Report]. Retrieved from https://www2.deloitte.com/global/en/pages/about-deloitte/articles/millennialsurvey.html

Dillon, M. (6 July 2020). European and American perspectives on mandatory human rights due diligence [Blog post]. *KSAPA*. Retrieved from https://ksapa.org/european-and-american-perspectives-on-mandatory-human-rights-due-diligence/

Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 amending Directive 2013/34/EU as regards disclosure of non-financial and diversity information by certain large undertakings and groups. *OJ* L 330, 15.11.2014, 1–9. Retrieved from http://data.europa.eu/eli/dir/2014/95/oj

Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC. *OJ* L 94, 28.3.2014, 65–242. Retrieved from http://data.europa.eu/eli/dir/2014/24/oj

Dubin, L. (21 December 2018). Corporate social responsibility clauses in investment treaties. *Investment Treaty News*. Retrieved from http://cf.iisd.net/itn/2018/12/21/corporate-social-responsibility-clauses-in-investment-treaties-laurence-dubin/

Esther Kiobel v. Royal Dutch Shell PLC, No. C-09-540972-HA ZA 17-1048, 1 May 2019, ECLI:NL:RBDHA:2019:4233. Retrieved from https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:RBDHA:2019:6670

European Coalition for Corporate Justice. (23 June 2020). High time for Swiss referendum on the Responsible Business Initiative as parliament dumps compromise proposal. *European Coalition for Corporate Justice*. Retrieved from https://corporatejustice.org/news/16815-high-time-for-swiss-referendum-on-the-responsible-business-initiative-as-parliament-dumps-compromise-proposal

European Commission. (2015). *Trade for all: Towards a more responsible trade and investment policy*. Luxembourg: Publications Office of the European Union. Retrieved from https://trade.ec.europa.eu/doclib/docs/2015/october/tradoc_153846.pdf

European Commission. (2019). Commission Staff Working Document 'Corporate Social Responsibility, Responsible Business Conduct, and Business & Human Rights: Overview of Progress'. SWD(2019) 143 final, 20.3.2019.

European Commission. (2020). Consultations on Non-financial reporting by large companies (updated rules). Retrieved from https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12129-Revision-of-Non-Financial-Reporting-Directive/public-consultation

Fundamental Rights Agency. (2019). *Business-related human rights abuse reported in the EU and available remedies* [Report]. Retrieved from https://fra.europa.eu/en/publication/2019/business-related-human-rights-abuse-reported-eu-and-available-remedies

Gregor, F., & Houston, J. (21 August 2020). Landmark report on 1,000 European companies shows the need for human rights due diligence laws [Blog post]. *Business & Human Rights Resource Centre*. Retrieved from https://www.business-humanrights.org/en/blog/landmark-report-on-1000-european-companies-shows-the-need-for-human-rights-due-diligence-laws/

Latorre, A. F. L. (2020). In defence of direct obligations for businesses under international human rights law. *Business and Human Rights Journal*, *5*(1), 56–83. https://doi.org/10.1017/bhj.2019.27

Lindholm, H., Egels-Zandén, N., & Rudén, C. (2016). Do code of conduct audits improve chemical safety in garment factories? Lessons on CSR in the supply chain from Fair Wear Foundation. *International Journal of Occupational and Environmental Health,* 22(4), 283-291. https://doi.org/10.1080/10773525.2016.1227036

Lithuania's Action Plan on the Implementation of the United Nations Guiding Principles on Business and Human Rights (2014). Retrieved from https://www.ohchr.org/Documents/Issues/Business/NationalPlans/Lithuania_NationalPlanBHR.pdf

Locke, R.M. (2013). *The Promise and Limits of Private Power. Promoting Labor Standards in a Global Economy*. Cambridge University Press. https://doi.org/10.1017/CBO9781139381840

Maastricht Guidelines on Violations of Economic, Social and Cultural Rights (4 March 1997). MCHR 97-124. Retrieved from http://hrlibrary.umn.edu/instree/Maastrichtguidelines_.html

McCorquodale, R., Smit, L., Neely, S., & Brooks, R. (2017). Human rights due diligence in law and practice. *Business and Human Rights Journal*, 2(2), 195–224. https://doi.org/10.1017/bhj.2017.2

Moreno Gómez v. Spain, No. 4143/02, ECHR 2004-X, 16 November 2004. ECLI:CE:ECHR:2004:1116JUD000414302.

Morris, D. (2020). *Driving change through public procurement: A toolkit on human rights for procurement policy makers and practitioners*. Copenhagen: The Danish Institute of Human Rights. Retrieved from https://www.humanrights.dk/sites/humanrights.dk/files/media/document/dihr_toolkit_public_procurement_2020_webaccessible.pdf

Parella, K. (2019). *Improving Human Rights Compliance in Supply Chains*. *Notre Dame Law Review*, 95(2), 727-793. Retrieved from https://scholarship.law.nd.edu/ndlr/vol95/iss2/5

Ramasastry, A. (2015). Corporate Social Responsibility Versus Business and Human Rights: Bridging the Gap Between Responsibility and Accountability. *Journal of Human Rights*, 14(2), 237–259. https://doi.org/10.1080/14754835.2015.1037953

Regulation (EU) No. 995/2010 of the European Parliament and of the Council of 20 October 2010 laying down the obligations of operators who place timber and timber products on the market. *OJ* L 295, 12.11.2010, 23–34. Retrieved from http://data.europa.eu/eli/reg/2010/995/oj

Regulation (EU) No. 2017/821 of the European Parliament and of the Council of 17 May 2017 laying down supply chain due diligence obligations for Union importers of tin, tantalum and tungsten, their ores, and gold originating from conflict-affected and high-risk areas. *OJ* L 130, 19.5.2017, 1–20. Retrieved from http://data.europa.eu/eli/reg/2017/821/oj

Schenk, S., Thorhauer, N. I., & Hubert, Q. (22 July 2020). Supply Chain Law in Germany: Current steps towards a mandatory human rights due diligence law. *Lexology*. Retrieved from https://www.lexology.com/library/detail.aspx?g=f1bde270-239d-40cd-85ad-d805adba5790

Sustainable Business in Sweden. (N.d.). *Sweden.se*. Retrieved from https://sweden.se/business/sustainable-business-in-sweden/

Šaltinytė, L. (2020). International legal personality: Towards legal duties of transnational corporations? In D. Gailiūtė-Janušonė, et al. (Eds.), *XXI amžiaus iššūkiai tarptautinei teisei. Liber Amicorum Sauliui Katuokai*. Vilnius: Mykolo Romerio universitetas; Baltijos kopija.

United Nations Committee on Economic, Social and Cultural Rights. (2012). *Concluding observations: Germany*. 12 November 2012, UN Doc. CCPR/C/DEU/CO/6.

United Nations Committee on Economic, Social and Cultural Rights. (2017). *General comment No. 24 (2017) on State obligations under the International Covenant on Economic, Social and Cultural Rights in the context of business activities*. 10 August 2017, E/C.12/GC/24. Retrieved from https://www.refworld.org/docid/5beaecba4.html

United Nations Conference on Trade and Development. (2018). *Recent developments in the international investment regime, Issue 1* [Report]. Retrieved from https://unctad.org/en/PublicationsLibrary/diaepcbinf2018d1_en.pdf

United Nations Conference on Trade and Development. (2018). *World investment report 2018: Investment and new industrial policies* [Report]. Retrieved from https://unctad.org/en/PublicationsLibrary/wir2018_en.pdf

United Nations Conference on Trade and Development. (2020). *World investment report 2020: International production beyond the pandemics* [Report]. Retrieved from https://unctad.org/en/PublicationsLibrary/wir2020_overview_en.pdf

United Nations Environment Programme Finance Initiative. (2019). *Principles for responsible banking: Guidance document*. Geneva: UNEP Finance Initiative. Retrieved from https://www.unepfi.org/wordpress/wp-content/uploads/2019/09/PRB-Guidance-Document-Final-19092019.pdf

United Nations Working Group on Business and Human Rights. (2018). *Corporate human rights due diligence – Getting started, emerging practices, tools and resources* [Annex to the Working Group's General Assembly report, A/73/163]. Retrieved from https://www.ohchr.org/Documents/Issues/Business/Session18/CompanionNote2DiligenceReport.pdf

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

United Nations Working Group on Business and Human Rights. (2020). Ensuring that business respects human rights during the Covid-19 crisis and beyond: The relevance of the UN Guiding Principles on Business and Human Rights [Press release]. *United Nations Human Rights*. Retrieved from https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=25837&LangID=E

Urbaser and Consorcio de Aguas Bilbao v. Argentina, ICSID Case No. ARB/07/26, Award, 8 December 2016. Retrieved from http://icsidfiles.worldbank.org/icsid/ICSIDBLOBS/OnlineAwards/C255/DC9852_En.pdf

Vedanta Resources Plc and Konkola Copper Mines Plc (Appellants) v. Lungowe and Others. (Respondents), [2019] UKSC 20, 10 April 2019. Retrieved from: https://www.supremecourt.uk/cases/docs/uksc-2017-0185-judgment.pdf

Von Hannover v. Germany, No. 59320/00, ECHR 2004-VI, 24 June 2004. ECLI:CE:ECHR:2004:0624JUD005932000

Wilson, *National Union of Journalists and Others v. the United Kingdom*, Nos. 30668/96, 30671/96, 30678/96, ECHR 2002-V, 2 July 2002. ECLI:CE:ECHR:2002:0702JUD003066896

Lyra JAKULEVIČIENĖ holds a PhD in law and is currently a professor at the Institute of International and EU Law in the Law School of Mykolas Romeris University, Lithuania. She served as the head of the Human Rights Laboratory at Mykolas Romeris University. Her research interests include international and EU law, human rights, asylum, and migration.
ORCID ID: https://orcid.org/0000-0002-2510-1196

Dovilė GAILIŪTĖ-JANUŠONĖ holds a PhD in Law and currently serves as associate professor at the Institute of International and EU Law in the Law School of Mykolas Romeris University, Lithuania. She served as a trainee at the European Court of Human Rights and as a legal expert for Lithuania on the FRANET research network. Her research interests include socio-economic human rights, right to housing, freedom of religion, and the right to private life.
ORCID ID: https://orcid.org/0000-0002-0987-528X

THE INFLUENCE OF TRAINING CONTENT, LEARNING AND TRAINING TRANSFER ON TRAINING EFFECTIVENESS: A CASE STUDY OF BOARD MEMBERS OF NON-PROFIT ORGANIZATIONS IN GAUTENG

Nthabiseng Kraai [1*], Pfano Mashau [2]

National Development Agency, 26 Wellington Road, Parktown, Johannesburg, South Africa
University of Kwazulu-Natal, Westville Campus, 238 Mazisi Kunene Road, Glenwood, Durban, South Africa

E-mails: [1] innokraai@gmail.com (Corresponding author); [2] mashaup@ukzn.ac.za*

Abstract. The objective of this research is to understand the effectiveness of National Development Agency (NDA) training; the study investigates the effects of training design characteristics (training content) and learning on training effectiveness. The study looked into the effect of training design factor consisting of training content and acquisition of skills and knowledge of trainees on training effectiveness in training program attended by Board members of NPOs in Gauteng Province. About 200 respondents from different NPOs in the Gauteng province of South Africa who attended the NPO Compliance and Governance training participated in the study through an online survey. Training content and learning of trainees have a significant effect on training effectiveness. Furthermore, the respondents indicated that their NPOs did not improve on their poor governance and non-compliance to the NPO Act as a result of the NDA training.

1. Introduction

Non-profit organizations (NPOs) play a significant role in the social and public spheres of South Africa. The Non-Profit Sector, by its virtue, does not exist to generate revenues but instead exists to meet the social needs of the marginalized while operating outside the ambit of Government. The National Development Agency and the National Lottery Distribution Trust Fund requires NPOs to be registered in terms of the NPO Act as a condition for funding. Furthermore, it is believed that registration contributes to increased NPO transparency and credibility (Sangonet, 2013). The Government and donors require NPOs to be legally registered to grant fund them; however, this is a challenge as most NPOs are de-registered due to non-compliance to the NPO Act. One common challenge faced by the Non-Profit sector is weak or non-existent governance structures, lack of accountability and transparency (Ebrahim, 2010). Furthermore, Limited knowledge on roles and responsibilities of the NPOs Board members, lack of accountability, and non-disclosure of finances are fundamental governance issues that weaken the effectiveness of the Non-profit sector. Good governance remains the heart of the effectiveness and

sustainability of the non-profit sector. There are supportive government initiatives in respect of NPOs which aims at making them accountable and transparent by enhancing the skills of the Board members. Despite training-supportive initiatives by both Government and the Private sector, the fact remains that the performance of NPOs concerning Governance and compliance to the NPO Act is not as expected.

The Department of Social Development (DSD) has a legislative role in monitoring the registered NPOs in South Africa. The monitoring process involves the annual submission of narrative and financial reports by the registered NPOs, and failure to do so leads to cancellation or de-registration. The NDA is a public entity, listed under Schedule 3A of the Public Finance Management Act (PFMA), Act 1 of 1999. The NDA reports to the Parliament of the Republic of South Africa through the Minister of Social Development. Moreover, the agency is mandated to contribute to the eradication of poverty and its causes. The NDA must contribute towards building the capacities of Civil Society Organisations to enable them to carry out development work effectively (National Development Agency Act No 108, 1998). In the financial year 2016/17, the NDA trained just more than three thousand Civil Society Organizations (CSOs) in all the nine provinces of South Africa on governance and NPO Act compliance. Resultantly, the impact of the NDA interventions has improved the compliance of those CSOs with the NPO Act (NDA, 2017, p. 8). The increasing numbers of the de-registered NPOs reported annually by DSD due to non-compliance to the NPO Act is an indication of the need for rigorous training to improve the status quo of the sector. Owing to the NDA investments towards the training, it is fundamental to understand if the training was worthwhile and relevant. All this boils down to evaluating the training effectiveness; as such, this research investigated the effects of training content on the trainee's learning and change in behaviour.

According to Homklin et al. (2014), further research is necessary to explore other multidimensional influencing training effectiveness. These factors include training design, as most research studies analysed the effects of individual and work environment factors on training effectiveness. Training content refers to "the result of deciding on what to include in the training program for learning to take place" (George & Singh, 2000, p. 149). Deciding on the training content is fundamental in ensuring that the training content matches the training needs and objectives of the trainees. The training content usually refers to what is taught, at which level and in what amounts (Alias, Ong, Rahim, & Hassan, 2019). The Kirkpatrick four-level evaluation model (1994) has served as the primary organizing framework for training evaluations for over 40 years (Bates & Coyne, 2005). The model delineates four levels of training outcomes: reaction, learning, behaviour, and results. Kirkpatrick's model assesses the effectiveness of training programs at four levels: Level 1-Reaction, the attitude of the trainees; Level 2- learning, the learner's learning outcomes and increases in knowledge, skill, and attitude towards the training (how much attendees learned the content after training); Level 3 –behaviour, the students' change in behaviour and improvement (whether the learning transferred into practice in the workplace); and Level 4-Results, the ultimate impact of training at the organizational level. In particular, the distinction between learning (level two) and behaviour (level three) has drawn increased attention to the importance of the learning transfer process in making training truly effective (Bates & Coyne, 2005). Therefore, in trying to understand the effectiveness of NDA training, the study investigates the effects of training design characteristics (e.g. training content) and learning (acquired skills and knowledge) on behaviour (training transfer) of Board members in Gauteng. In the NDA, evaluation of training is usually done immediately after the training by using feedback forms.

The NDA training approach is more theoretical and is delivered through PowerPoint presentations with no tests given to the trainees to test their knowledge because of the training. According to Kirkpatrick's model, NDA can be considered to be only measuring its training at the "Reaction" level, the other levels such as learning and behaviour are not known. "Organizations that are considering reaction as the only parameter to gauge the effectiveness of training can be highly misled by results as reactions of trainees after the end of training do not reflect the true and complete picture of actual training effectiveness" (Rehmat, et al., 2015). Furthermore, the training duration is about one to three days. This evaluation approach has limitations, as it does not look into what has been learned and transferred back in the job months after the NDA intervention. Consequently, the

effectiveness of such intervention cannot be confirmed in the context of the acquisition of new skills, attitudes and knowledge, and their transferability back in the organizations thereof. The study attempts to fill in, at least partly, the present gap in understanding the factors affecting the transfer of training in NPOs and provide some inputs for designing training interventions effectively to ensure greater transfer. The findings of this study would help the NDA to deliver its future training interventions that support the NPOs in improving their current status of poor governance and non-compliance to the NPO Act.

2. Literature Review

Training and development are indispensable strategic tools for competent individual and organization performance; thus, organizations are spending money on it with confidence that it will earn them a competitive advantage in the world of business (Falola, Osibanjo, & Ojo, 2014). The previous literature has identified three main determinants of training transfer, namely work environment (Na-nan, et al., 2017), trainee characteristics (Singh, 2017) and training design (Phillips & Bullock, 2018). Many organizations invest lots of their financial annually on training initiatives; however, few organizations possess training programs that effectively transfer received training back on the job to improve performance (Foxon, 1993). Furthermore, learning satisfaction achieved through the cognitive apprenticeship teaching approach during the training course was found to be superior to that achieved through the conventional teaching approach of lecturing, as a result, the acquired skills and knowledge from the training were transferred back in the workplace (Tsui & Chen, 2020). The perceived importance of training content influences training transfer (Bhatti, Battour, Sundram, & Othman, 2013). The extensive reviewed literature on training transfer identified several factors such as the learning environment, cultural differences and work environment. Furthermore, training content design amongst other factors was found to have an impact on training effectiveness (Mohanty, Dash, & Das, 2019). The training content should be understandable and applicable to the trainees, and the materials should be consistent with the proposed course, learning objectives, and outcomes (Falola, Osibanjo, & Ojo, 2014). A study by El-Hajjar and Alkhanaizi (2018) found a positive linear correlation between training content relatedness and training effectiveness. In other words, training content that relates to everyday duties will positively affect the transfer of skills and knowledge in the job. The perceived usefulness of the training content affects the reaction, learning, and behaviour of trainees (Nikandrou, Brinia, & Bereri, 2009).

Furthermore, Bjerregaard et al. (2016) found training content relatedness to the actual day-to-day work activities to have a significant influence on the trainee' reaction, learning and an increase in the motivation to transfer learning. The findings coincide with those by Grossman and Salas (2011) who found a positive relationship of content relatedness to the trainees' attitude, learning, and transfer of learning. The leaners' perception that "training content is similar to the actual job tasks" also leads to a positive affective reaction, learning and transfer motivation (Bhatti & Singh, 2010). There was an improvement in test scores of the students after the team-based learning sessions when compared to the test scores after lecture sessions. The study found a higher amount of knowledge retention on team-based exercises as compared to just lecture sessions, consequently, training was effectiveness as the knowledge and skills were transferred back in the job by a majority of the respondents (Rezaee, et al., 2016).

Moreover, the overall results of the study by (Heydari, et al., 2019) suggested an increase in learning and satisfaction can lead to changes in behaviour scores. This means that learning of new skills and knowledge that are relevant and useful can lead to the transfer of training. There were also significant direct effects between perceived content validity and perceived application to practice (Grohmann, Beller, & Kauffeld, 2014). This finding suggests that knowledge that is explicit in terms of similarity between the training content and the job requirements is crucial as it boosts trainees' confidence in applying what they have learned back in the work environment. Gegenfurtner et al. (2009) suggest that setting clear training objectives may contribute towards the improved transfer of learning. Prior research showed a positive relationship between the training objective and

transfer of knowledge (Diamantidis & Chatzoglou, 2012). The absence of training objectives and goals have adverse effects on the training evaluation process (Goldstein & Ford, 2002).

Furthermore, training objectives were found to have a significant effect on trainees' reaction, learning and behavioural change (Diamantidis & Chatzoglou, 2012). Other studies found a significant relationship between training objectives and results (Lin et al., 2011; Homklin et al., 2014). Research has proven the unlikelihood of training efforts to result in positive changes in job performance if no newly competencies have been transferred back in the work environment (Montesino, 2002). As a result, there has been an increased effort in understanding the antecedents and consequences of transferring learning back in the workplace (Velada, Michel, & Caetano, 2007). Concerning acquisition of new skills and knowledge as the influencers of training transfer, the learning moderated the relationship between the application of training and the transfer of training (Alfonso, Jorge, & Mara, 2018). Also, the learning culture moderates the relationship between the application of training and the transfer of training. However, measures of learning outcomes lack sophistication and the relationships between many of the key learning and teaching factors have not been clarified. As a result, continuing to understand the influence of learning on the transfer of training, learning factors and teaching approaches should not be studied in isolations (Deng, et al., 2019).

Research Hypotheses

This study aims to understand the influence of training content and trainee's learning on training effectiveness. The following hypotheses were formulated (Figure 1):

H1: Training content positively affect training effectiveness

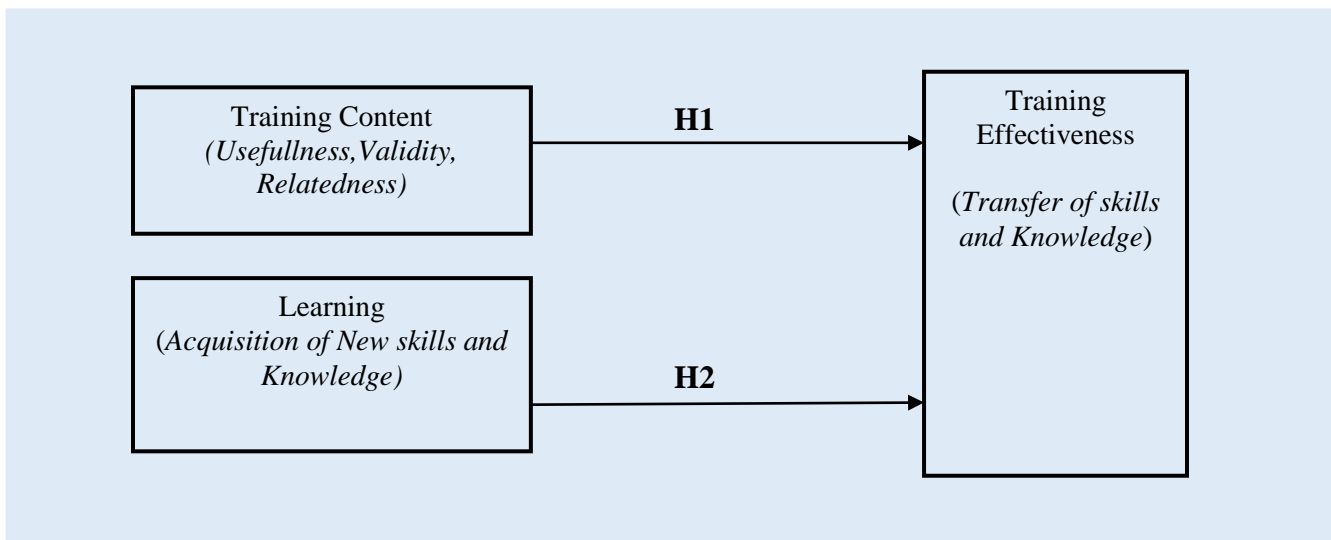**H2:** Learning (skills, attitude and knowledge) positively affect training effectiveness

Figure 1. Hypothesized Framework

3. Research Design and Methodology

3.1 Population and Sample Selection

The population size was 589. Since the researcher is evaluating the effectiveness of governance training, the sample included elements that constitute the individuals who are members of the governing body/Board members of the NPOs. The unit of analysis is Board members of NPOs in Gauteng province that attended the NDA training in the year 2015. A sampling frame is a list or other device used to define a researcher's population of interest. The sampling frame defines a set of elements from which a researcher can select a sample of the target population (Lewis-Beck, Bryman, & Liao, 2004). Once a sampling frame is in place, a decision on the sampling size commences, and then followed by the method of sampling, which can be either probability or non-probability (Sekaran & Bougie, 2014). In probability sampling, all elements of the population have an equal and known (non-zero) probability of being included in the sample (Alvi, 2016). The NDA training database was used as a sampling frame to select the study participants.

3.2 Data Collection

The study employed a survey strategy to collect primary data to achieve descriptive statistics. A simple random probability was used as a sampling technique. The determination of the sample size for the study was 95% level of confidence, with a margin of error of five; this means that the sample size of the study was 253 respondents. The questionnaire comprised of 19 items (6-demographic information, 13 statements). A five-point Likert scale was used to measure the variables with values ranking from lowest to highest where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. Through the review of the literature, the process resulted in four indicators of learning, four indicators of training content and five indicators of training effectiveness. All the study participants received a link through their email to participate in the online survey. The survey questions were drawn from the study by Al-Mughairi (The evaluation of training and development of employees: The case of a national oil and gas industry, 2018). In ensuring the measurement validity, a pilot study was conducted by the researcher amongst the 18 Board members who received the same training. The pilot participants were not included in the sample of the actual study. The primary data were collected between the 07th January 2019 and 26th July 2019. In ensuring that the rate of responses is satisfactory, the survey was designed to send reminders bi-monthly, and no further responses were allowed after the cut-off date of the 26th July 2019.

4. Results and Discussion

The basic purpose of the study was to understand the effectiveness of NDA training by investigating the effects of training design characteristics (training content and objectives) on learning and behaviour of the Board members of the NPOs that attended the NDA training. The results show that there is a little improvement of the skills and knowledge of Board members that attended the NDA training as well as the transfer of training back in their organizations, which supports the basic argument of this study that the perceived effectiveness and return on investment on this training by the NDA is unknown.

4.1. Data Management and Screening

The data collection process was undertaken from January 2019 to July 2019. The questionnaire was distributed to 253 respondents through an online survey via simple random sampling technique. The SPSS for Windows (version 24) software was used to clean the data and screen the data by identifying any outliers, missing data and descriptive statistics. After the identification of anomalies in the data, a set of procedures were applied for handling outliers to ensure that the data analysis is accurate. Kurtosis and skewness were used to assess the normality distribution of the data. Missing data is the unavailable values for one or more variables (Hair, Sarstedt,

Hopkins, & Kuppelwieser, 2014). The missing of data is common in survey studies (Bryman & Cramer, 2011). Furthermore, missing data can influence the ability of statistical tests to establish relationships in a data set, and as a result, it causes parameter estimates that are biased (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014). Univariate detection method through SPSS was used to identify outliers. The detection of univariate outliers assisted the researcher in identifying cases with minimum and maximum values per variable. The data were first converted to standardized scores (z-scores). According to Tabachnick and Fidell (Using Multivariate Statistics, 2013), the cut-off value for potential outliers is ± 3.29; any value exceeding this number is considered a potential outlier. This study adopted a cut-off value of ± 3.29 for the standardized scores as potential outliers. There were nine cases detected with outliers, after removing the nine cases (*Case 3, 5, 8, 102, 18, 23, 104, 178 and 194*) that had the same answers throughout the questionnaire. These were cases with z-score of more than ± 3.29. As indicated earlier in this section, the nine cases/respondents selected the same responses on a Likert-scale for all the statements in the questionnaire. The number of returned/completed questionnaires was 209 after the removal of cases with outliers, and there were no missing values. These responses could not be disregarded as they could affect the reliability of the results. The cases were removed from the dataset, leaving the number of responses to 200 from the initial 209, which then translated to a sample size of 79% appropriate for further data analysis.

4.2 Descriptive Analysis

The researcher applied the descriptive analysis (frequencies and means) to understand the preliminary data and to summarise the demographic information of the respondents to get a feel of the preliminary data (Sekaran, 2003). Furthermore, Cronbach's Alpha test computed to measure the internal consistency of the instrument. The minimum performed acceptance for Cronbach's alpha was 0.7 for the reliability coefficients (Hinton, Brownlow, Mcmurray, & Cozens, 2004). The distribution of respondents by gender; age; education, NPO location, experience and occupation are depicted in Figure 2.
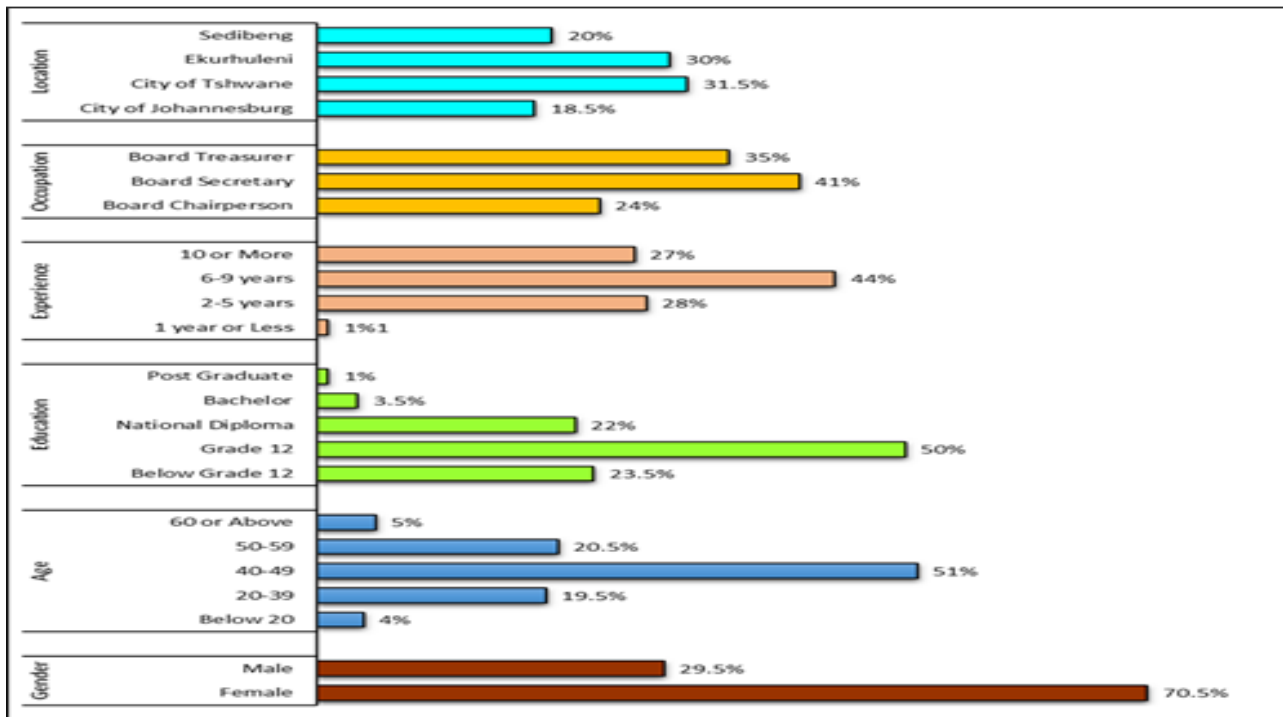

Figure 2. Demographics of the Study Respondents

The results indicate that the majority of the respondents were females (70.5%, n=141), while 29.5% (n= 59) comprised of male respondents, this is a common feature in the NPO sector, especially within the South African context whereby majority are women. Grouping according to age shows (51%) of the respondents were between 40 and 49 years of age. The second-highest percentage of respondents was 20.5% (n=41) who were between 50 and 59 years old, 19.5% (n=39) were between 20 and 39 years old, 5% (n=10) were 60 years or older, and finally, about 4.3% (n=8) were below 20 years of age. The most significant percentage of respondents were based in City of Tshwane with 31.5% (n=63), while the second-largest number of respondents selected Ekurhuleni with 30% (n=60), followed by Sedibeng with 20% (n=40). A slightly small number of respondents indicated that their organizations are in City of Johannesburg 18.5% (n=37). The highest percentage of respondents had between 6-9 years of NPO work experience with 44% (n=88), followed by 2-5 years of work experience with 28% (n=56), then ten years or more with 27% (n=54) while only 1.1% (n=2) of the respondents had one year or less of NPO work experience. The highest percentages of the survey respondents were Board secretaries within their respective NPOs at 41% (n=82), while 35% (n=70) were Board treasurers and 24% (n=48) were Chairpersons of the NPO Board.

Table 1. Reliability Results of the Study Construct

Constructs	Items	Items Deleted	Cronbach's alpha
Learning	4	0	.763
Training Content	4	0	.751
Training Effectiveness	5	0	.821
Total Items	13	0	

The internal consistency of the reliability of the instrument showed a good internal consistency for all the three study constructs. All the elements within each construct conformed to the minimum criteria of Cronbach's Alpha ($\alpha \geq .70$). The Cronbach's alpha value for training content (0.751) was acceptable, though lower than those of learning (0.763) and training effectiveness (0.821). As maintained by Hinton et al. (SPSS Explained, 2004), the internal consistency of 0.7 is acceptable, and the instrument can be deemed reliable to measure what it is intended to if it meets this minimum score. No items were deleted to increase the Cronbach's score as they all exceeded a minimum acceptable of Cronbach's Alpha score.

The learning construct statements outlined in Table 2 indicate a level of disagreement for "I learned a lot on NPO Governance and compliance to the NPO Act from this training" (M=2.92). Respondents expressed a high agreement for "I have forgotten most of what I learned from this training programme." (M=4.16). Moreover, neutral responses for "My newly acquired skills and knowledge qualify me for dealing with poor governance issues." (M=3.43), and "My newly acquired skills and knowledge qualify me for dealing with NPO Act compliance issues" (M=3.08). The training content construct statements indicate a high level of neutral responses for "The information provided in this training programme was easy to apply" (M=3.10), "Information offered in this training improved my professional competencies" (M=3.07) and "The importance of applying training skills in the workplace was identified". Respondents expressed a level of strong disagreement for "The knowledge and skills required for my job were well supported by the practical activities and exercises of this training programme" (N=1.73). The final construct of training effectiveness indicates a neutral response for "I have applied what I learned in the workplace" (M=3.06) and "I am committed to utilizing the skills and knowledge from the training" (M=3.03). The items with lower Means scores were associated with "I have transferred what I learned to my colleagues in the NPO" (N=2.99), "My NPO has improved its non-compliance and poor

governance because of this training" (N=2.99) and "The training has helped in performing my roles and responsibilities better than before". NPOs are de-registered by the DSD annually of which mostly are as a result of non-compliance to the NPO Act.

Table 2. Descriptive Statistics (n=200)

Items	Mean	Std. Deviation
Learning Construct		
I learned a lot on NPO Governance and compliance to the NPO Act from this training	2.92	1.151
I have forgotten most of what I learned from this training programme	4.16	.957
My newly acquired skills and knowledge qualify me for dealing with poor governance issues	3.43	1.226
My newly acquired skills and knowledge qualify me for dealing with NPO Act compliance issues	3.08	1.232
Training Content Construct		
The information provided in this training programme was easy to apply	3.10	1.178
The information offered in this training improved my professional competencies	3.07	1.096
The knowledge and skills required for my job were well supported by the practical activities and exercises of this training programme.	1.73	.775
The importance of applying training skills in the workplace was identified	3.09	1.138
Training Effectiveness Construct		
I have applied what I learned in the workplace	3.06	1.128
I am committed to utilizing the skills and knowledge from the training	3.03	1.086
I have transferred what I learned to my colleagues in the NPO	2.99	1.132
My NPO has improved its non-compliance and poor governance because of this training	2.99	.902
The training has helped in performing my roles and responsibilities better than before	2.28	.828

4.3 Results of the Hypothesis Testing

The study used regression analysis to test all the hypothesized effects. Means of dimensions and constructs were used to estimate the effects of training content on training effectiveness and trainee'learning on training effectiveness. A simple linear regression was used to test H1-H2. First, training effectiveness was regressed on training content to test H1. The results show that training content (β=0.830) exerted significant positive effects on training effectiveness. A significant regression equation was found (F (1,198) = 438.668, p<.001, with an R^2 of 0.689. Thus H1 was fully supported. Second, training effectiveness was regressed on learning to test H2. The results for Model 2 showed that "learning" (β=0.620) exerted significant positive effects on training effectiveness. A significant regression equation was found (F (1,198) = 123.626, p<.001, with an R^2 of 0.384. Thus, H2 was fully supported. Finally, training content and learning were incorporated into the regression model as independent variables to assess Model 3. The results of the regression showed that training content (β=0.710) and learning (β=0.206) exerted significant positive effects on training effectiveness ($R^2 = 0.717, F = 249.406$). Therefore, the results suggest that training content, acquisition, and transfer of skills and knowledge are predictors of training effectiveness.

Table 3. Correlation Analysis

		Learning	Training Content	Training Effectiveness
Learning	Pearson Correlation	1	.584**	.620**
	Sig. (2-tailed)		.000	.000
	N	200	200	200
Training Content	Pearson Correlation	.584**	1	.830**
	Sig. (2-tailed)	.000		.000
	N	200	200	200
Training Effectiveness	Pearson Correlation	.620**	.830**	1
	Sig. (2-tailed)	.000	.000	
	N	200	200	200
**. Correlation is significant at the 0.01 level (2-tailed).				

4.4 Correlation Analysis

The study examined the correlation between the construct to assess the nature and strength of the relationship between them. According to Table 3, learning construct has a significant and strong correlation with both the training content and training effectiveness. The association is positive for all constructs. The findings suggest that the training content and training objectives significantly and positively influence the transfer of training These findings are consistent with other research works that found training content validity (e.g., Singh, 2017) and content relatedness (e.g., Alkhanaizi, 2018; Bjerregaard et al. (2016) to have a positive influence on the transfer of training.

5. Conclusions

This study found a positive correlation between training content, trainee's learning and training effectiveness. Training effectiveness, as indicated earlier in the literature, is determined through the acquisition of new skills and knowledge (learning), and transferability of those skills back in the workplace. The study proves the fundamental value of ensuring that training content is relevant and easy to apply back in the workplace. Furthermore, practical activities and exercises during the training have proved to be crucial in allowing transferability of the training content. This was shown by the results whereby trainees indicated that they have not transferred what they were trained on; consequently, the was no improvement in their respective NPOs relating to poor governance and non-compliance to the NPO Act. Moreover, majority of the respondents indicated that the status of both governance and non-compliance to the NPO Act within their organisations have not improved even after attending the NDA training and there were no practical exercises or activities during the training, this can at least partly be attributed to the inadequate transfer of training which has resulted in a situation of training not being contributory in improving their governance and non-compliance.

Training organizations cannot ignore the importance of designing the training programmes in such a way that motivation to learn and transfer are increased and sustained. Additional research is necessary to look at other

training design factors, environmental factors that can increase the effectiveness of training. The NDA should consider a comparison analysis of the pre-training needs assessment and post-training a few months after the training has been conducted to be able to measure the return on investment. As far as the authors are aware, there is no published work on how training content and transfer of skills and knowledge has led to the effectiveness of training, especially within the non-profit space. Indeed, at present, research in the effectiveness of Government training in South Africa towards the improvement of the non-profit sector, especially compliance to the NPO Act is still in its infancy stages. However, work has been carried out to evaluate training effectiveness, but have not comprehensively considered the non-profit sector, especially in South Africa.

The research design applied is not without some methodological and theoretical limitations that should be noted. The data were collected from individuals who attended the training in Gauteng province only due to the geographical disperse of all NDA trained NPOs and the resource constraints associated with coverage of such dispersed geographical cover. Whenever possible, data to measure the effectiveness of an intervention should be collected from a larger sample in different provinces, multiple sources, including trainees, peers, other training institutions and the actual trainers who were involved in this particular training intervention. Also, it is reasonable to conduct evaluations that include a control or comparison group that has not received the intervention that is being evaluated. Therefore, further studies could use multiple sources, expand the geographical focus to all the nine provinces and include control groups.

Moreover, the findings are grounded on the NDA trained NPOs only, thus limiting the generalizability of the research findings. It is unclear whether the same pattern would occur in NPOs of other countries, and whether the results obtained from this survey would apply to other populations due to cultural differences. Future research could examine the cross-cultural aspects of this topic to determine the extent to which these results are specific to a province, country, sector or training area. Concerning the theoretical limitation, the study did not consider other factors influencing training effectiveness—factors such as individual characteristics, training design characteristics and environmental factors. Future research could examine the impact of these factors on training effectiveness of the NDA programme. The limitations indicated in this paper do not make the findings of this research less critical but instead mentioned to direct future research initiatives that could support more significant improvement in this area. Moreover, the NDA can further research on what motivates the trainees to learn new skills and transfer them back on the job. Since the training approach by the NDA was more theoretical than practical, it is further suggested that learning should be combined with training or teaching approaches as argued by Den et al. (2019) so that the NDA can understand if perhaps the teaching approach does not promote learning and its retention.

References

Alfonso, J. G., Jorge, L. G., & Mara, M. (2018). The effect of learning culture on training transfer: empirical evidence in Spanish teachers. *International Journal of Human Resource Management*. https://doi.org/10.1080/09585192.2018.1505763

Alias, S. A., Ong, M. H., Rahim, A. R., & Hassan, R. (2019). The Role of Training Design Factors in Influencing Training Effectiveness among Public Service Employees. *International Journal of Academic Research in Business and Social Sciences, 9*(5), 898-913. http://dx.doi.org/10.6007/IJARBSS/v9-i5/6016

Al-Mughairi, A. M. (2018). *The evaluation of training and development of employees: The case of a national oil and gas industry.* London: Brunel University. Retrieved March 20, 2020, from https://bura.brunel.ac.uk/bitstream/2438/17062/1/FulltextThesis.pdf

Alvarez, K., Salas, E., & Garofano, C. M. (2004). An Integrated Model of Training Evaluation and Effectiveness. *Human Resource Development Review, 3*(4), 385-416. https://doi.org/10.1177/1534484304270820

Alvi, M. H. (2016, March 23). *Munich Personal RePEc Archive.* Retrieved February 12, 2019, from https://mpra.ub.uni-muenchen.de/70218/1/

Baldwin, T. T., & Ford, J. K. (1988). Transfer of Training: A Review and Directions for Future Research. *Personnel Psychology, 41*(1), 63-105. https://doi.org/10.1111/j.1744-6570.1988.tb00632.x

Bates, R., & Coyne, T. H. (2005). *Effective Evaluation of Training: Beyond the Measurement of Outcomes.* Retrieved April 12, 2020, from https://files.eric.ed.gov/fulltext/ED492371.pdf

Bhatti, M. A., & Singh, S. K. (2010). The role of individual and training design factors on training transfer. *Journal of European Industrial Training, 34*(7), 656-672. https://doi.org/10.1108/03090591011070770

Bhatti, M. A., Battour, M. M., Sundram, V. P., & Othman, A. A. (2013). Transfer of training: does it truly happen?An examination of support, instrumentality, retention and learner readiness on the transfer motivation and transfer of training. *European Journal of Training and Development, 37*(3), 273-297. http://dx.doi.org/10.1108/03090591311312741

Bjerregaard, K., Haslam, S. A., & Morton, T. (2016). How identification facilitates effective learning: the evaluation of generic versus localized professionalization training. *International Journal of Training and Development, 20*(1), 17-37. https://doi.org/10.1111/ijtd.12067

Bryman, A., & Cramer, D. (2011). *Quantitative data analysis with IBM SPSS 17, 18 and 19: A guide for social scientists.* Routledge-Cavendish/Taylor & Francis Group.

Coakes, S. J. (2012). *SPSS version 20.0 for Windows: analysis without anguish* (20th, illustrated ed.). Wiley& Sons

Deng, R., Benckendorff, P. & Gannaway, D. 2019. Progress and new directions for teaching and learning in MOOCs. *Computers and Education,* Sējums 129, pp. 48-60. https://doi.org/10.1016/j.compedu.2018.10.019

Diamantidis, A. D., & Chatzoglou, P. D. (2012). Evaluation of formal training programmes in Greek organizations. *European Journal of Training and Development, 36*(9), 888-910. https://doi.org/10.1108/03090591211280955

Ebrahim, A. (2010). Nonprofit Agency Challenges. *Journal of Policy Analysis and Management, 29*(3), 628-632. https://doi.org/10.1002/pam.20519

El Hajjar, S. T., & Alkhanaizi, M. S. (2018, April-June). Exploring the Factors that Affect Employee Training Effectiveness: A Case Study in Bahrain. *Sage Open-Research Paper*, pp. 1-12. https://doi.org/10.1177/2158244018783033

Falola, H. O., Osibanjo, A. O., & Ojo, S. I. (2014). Effectiveness of Training and Development on employee's performance and Organisation Competitiveness in the Nigerian Banking Industry. *Bulletin of the Transilvania University of Braşov Series V: Economic Sciences, 7(56)*(1), 161-170. Retrieved April 08, 2020, from https://ro.vlex.com/vid/effectiveness-of-training-and-553901022

Field, A. (2013). *Discovering Statistics Using IBM SPSS Statistics* (4th ed.). London: SAGE Publishers.

Foxon, M. (1993). A process approach to the transfer of training. *Australian Journal of Educational Technology, 9*(2), 130-143.
Gegenfurtner, A., Veermans, K., Festner, D., & Gruber, H. (2009). Integrative Literature Review: Motivation to Transfer Training: An Integrative Literature Review. *Human Resource Development Review, 8*(3), 403-423. https://doi.org/10.1177/1534484309335970

George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference. 11.0 Update* (4th ed.). Boston: Allyn & Bacon.

George, T., & Singh, S. (2000). *Human Resource Development in Organisation.* National Institute of Public Institution.
Goldstein, I. L., & Ford, K. (2002). *Training in Organizations: Needs Assessment, Development and Evaluation* (4th ed.). Belmont: Wadsworth: Thomson Learning.

Grohmann, A., Beller, J., & Kauffeld, S. (2014). Exploring the critical role of motivation to transfer in the training transfer process. *International Journal of Training and Development, 18*(2), 84-103. https://doi.org/10.1111/ijtd.12030

Grossman, R., & Salas, E. (2011). The transfer of training: what really matters. *International Journal of Training and Development, 15*(2), 103-120. https://doi.org/10.1111/j.1468-2419.2011.00373.x

Hair, J., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. (2014). Partial Least Squares Structural Equation Modeling (PLS-SEM): An Emerging Tool for Business Research. *European Business Review, 26*(2), 106-121. https://doi.org/10.1108/EBR-10-2013-0128

Heydari, M. R., Taghva, F., Amini, M. & Delavari, S., 2019. Using Kirkpatrick's model to measure the effect of new teaching and learning methods workshop for health care staff. *BMC Research Notes,* 12(388), pp. 2-5. https://doi.org/10.1186/s13104-019-4421-y

Hinton, P. R., Brownlow, C., Mcmurray, I., & Cozens, B. (2004). *SPSS Explained* (1st ed.). New York: Routledge.
Ho, R. (2006). *Handbook of Univariate and Multivariate Data Analysis and Interpretation with SPSS* (1st ed.). Rockhampton, Australia: Taylor & Francis Group.

Holton, E. F. (2005). Holton's Evaluation Model: New Evidence and Construct Elaborations. *Advances in Developing Human Resources, 7*(1), 37-54. https://doi.org/10.1177/1523422304272080

Homklin, T., Takahashi, Y., & Techakanont, K. (2014). The influence of social and organizational support on the transfer of training: Evidence from Thailand. *International Journal of Training and Development, 18*(2), 116-131. https://doi.org/10.1111/ijtd.12031

Huczynski, A. (1983). Training Designs for Organisational Change. *Journal of European Industrial Training, 7*(3), 24-27. https://doi.org/10.1108/eb002147

Kline, R. B. (2005). *Principles and practice of structural equation modelling* (2nd ed.). Guilford Press.
Lewis-Beck, M. S., Bryman, A., & Liao, T. F. (2004). *The Sage Encyclopedia of Social Science Research Methods* (1st ed.). USA Sage Publications

Lim, D. H. (2000). Training design factors influencing transfer of training to the workplace within an international context. *Journal of Vocational Education and Training*, 243-258. https://doi.org/10.1080/13636820000200118

Mohanty, P. C., Dash, M., & Das, S. (2019). A study on factors influencing training effectiveness. *International Symposium, 40*(2), 7-15. Retrieved May 24, 2020, from https://www.researchgate.net/publication/330533636

Montesino, M. U. (2002). Strategic alignment of training, transfer-enhancing behaviors, and training usage: A post-training study. *Human Resource Development Quarterly, 13*(1), 89-108. https://doi.org/10.1002/hrdq.1015

Na-nan, K., Chaiprasit, K. & Pukkeeree, P., 2017. Influences of workplace environment factors on employees' training transfer. *Industrial and Commercial Training,* 49(6), pp. 303-314. https://doi.org/10.1108/ICT-02-2017-0010

National Development Agency Act No 108. (1998). The National Development Agency Act. Cape Town: Republic of South Africa. Retrieved May 08, 2020, from: https://www.westerncape.gov.za/assets/departments/social-development/national_development_agency_act_108_of_1998.pdf

NDA. (2017). *Annual Report 2016/17.* Johannesburg: NDA. Retrieved April 21, 2020, from https://www.nda.org.za/assets/resources/3BE50F99-C163-494E-B564-2E16BA55A0C7/NDA_AR_2016_17_Final.pdf

Nikandrou, I., Brinia, V., & Bereri, E. (2009). Perspective on practice. Trainee perceptions of training transfer: an empirical analysis. *Journal of European Industrial Training, 33*(3), 255-270. https://doi.org/10.1108/03090590910950604

Oztuna, D., Elhan, A., & Tuccar, E. (2006). Investigation of four different normality tests in terms of type 1 error rate and power under different distributions. *Turkish Journal of Medical Sciences, 36*(6), 171-176.

Phillips, S. & Bullock, A., 2018. Clinical leadership training: an evaluation of the Welsh Fellowship Programme. *Leadership in Health Services,* 31(2), pp. 1751-1879. https://doi.org/10.1108/LHS-06-2017-0038

Reber, R. A., & Wallin, J. A. (1984). The effects of training, goal setting and knowledge of results on safe behaviour: a component analysis. *The Academy of Management Journal, 27*(3), 544-560. https://doi.org/10.2307/256044

Sangonet. (2013). *ngoPulse*. Retrieved May 03, 2020, from: http://www.ngopulse.org/blogs/de-registration-npos-south-africa-what-you-need-know

Sekaran, U. (2003). *Research methods for business: a skill business approach* (4th ed.). USA: Joh Wiley & Sons.

Sekaran, U., & Bougie, R. (2014). *Research Methods for Business* (6th ed.). New York: Wiley & Sons.

Singh, S., 2017. Trainee Characteristics and Transfer of Training: Effect of Supervisory Support (A Study of Public Managers in Nepal). *Journal of Business and Management Research,* 2(1), 1-13. https://doi.org/10.3126/jbmr.v2i1-2.18148

Tabachnick, B. G., & Fidell, L. S. (2013). *Using Multivariate Statistics* (6th ed.). California: Pearson.

Tracey, J. B., Tannenbaum, S. I., & Kavanagh, M. J. (1995). Applying trained skills on the job: The importance of the work environment. *Journal of Applied Psychology,* 80(2), 239-252. https://doi.org/10.1037/0021-9010.80.2.239

Tsui, P.-L. & Chen, Y.-C., 2020. Sustainable Development of Hotel Food and Beverage Service Training: Learning Satisfaction with the Situated Cognitive Apprenticeship Approach. *Sustainable Education and Approaches,* 12(5), 1-16. https://doi.org/10.3390/su12051951

Velada , R., Michel, J. W., & Caetano, A. (2007). The effects of training design, individual characteristics and work environment on the transfer of training. *International Journal of Training and Development,* 11(4), 282-294. https://doi.org/10.1111/j.1468-2419.2007.00286.x

Westfall, P. H. (2014). Kurtosis as Peakedness, 1905-2014. R.I.P. *National Institute of Health,* 68(3), 191-195. https://doi.org/10.1080/00031305.2014.917055

Nthabiseng KRAAI is a Knowledge Management Specialist at the National Development Agency (NDA). Her work is in the social research space where she profiles Best Practices for the projects that are funded by the NDA to eradicate poverty in South Africa. She holds a Bsc Degree in Computer Sciences, Masters of Business Administration (MBA) and currently enrolled with the University of Kwa-Zulu Natal for Doctoral of Business Administration (DBA). Her research interests are in Civil Society Organizations, Innovation, Training and Development, Sustainability and Early Childhood Development.
ORCID ID: 0000-0002-9273-0224

Pfano MASHAU is an academic at the University of KwaZulu-Natal (UKZN), Graduate School of Business and Leadership (GSBL). He has a PhD in Management obtained at the UKZN. His research interest lies in the area of Innovation, Entrepreneurship and Local Economic Development. His current research focuses on the role of innovation incubators as drivers of entrepreneurship and agglomeration economies.
ORCID ID: 0000-0003-0490-1925

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
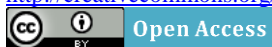
THE FINANCIAL DEVELOPMENT AND THE REAL ESTATE MARKET IN VIETNAM: A STUDY IN CASE OF THE GLOBAL FINANCIAL CRISIS

My-Linh Thi Nguyen [1], Toan Ngoc Bui [2]

[1] *Faculty of Finance and Banking, University of Finance – Marketing (UFM), Ho Chi Minh City, Vietnam*
[2] *Faculty of Finance and Banking, Industrial University of Ho Chi Minh City (IUH), Ho Chi Minh City, Vietnam*

E-mails:[1] ntmylinh@ufm.edu.vn; [2] buingoctoan@iuh.edu.vn

Abstract. This paper is the first empirical evidence for the impact of financial development on the real estate market (REM) in Vietnam. The researchers utilize time series data in Vietnam in the period from 2004:Q3 to 2018:Q4. By using the autoregressive distributed lag (ARDL) model, the paper analyzes the impact of financial development through the banking system development and the stock market development on the REM in the short and long term. The research results are consistent with some previous studies as the impact of financial development on REM is found in the short and long term, and the impact is mainly positive. In particular, the impact of the banking system development on the REM is stronger than the impact of the stock market development on the REM. In addition, the paper also achieves great success in discovering the negative impact of the global financial crisis on the In particular, the impact of the banking system development on the REM is stronger than the impact of the stock market development on the REM in the short and long term, which is a new discovery compared to the previous studies. These findings are significant for the In particular, the impact of the banking system development on the REM is stronger than the impact of the stock market development on the REM in the economies all over the world, especially for a developing country like Vietnam.

Keywords: ARDL; financial development; financial crisis; real estate; Vietnam

1. Introduction

The income variance around the world can be explained through the differences in the financial development across countries (Buera, Kaboski, & Shin, 2011; Buera & Shin, 2013). Accordingly, collateral used in loan agreements plays an important role. Indeed, in the countries with efficient financial development, solid development of banking system and stock market, financial services will be better than the countries with poor financial development (Bencivenga, Smith, & Starr, 1995; Esso, 2010; King & Levine, 1993; Bui, 2020).

Therefore, in the countries with efficient financial development, capital can be accessed from the stock market or the banking system (including mortgage of real estate for loans) (Nguyen, Xuan, & Bui, 2020). In the countries with poor financial development, the access to capital is mainly through real estate mortgages, which contributes to the decrease in financial market imperfections (Lim, 2018; Bui, 2019). The access to capital from the banking system or from the stock market helps households and enterprises to increase the capital for consumption and investment. Meanwhile, real estate is considered as both an investment and consumer goods (Kapopoulos & Siokis, 2005). Therefore, financial development could bring about an increase in real estate prices, possibly even forming the bubble phenomenon in the REM (Lim, 2018). However, a poorly supervised financial system may be vulnerable to crisis (Moshirian & Wu, 2012). The global financial crisis (which appeared in late 2007) is a testament to this and has a substantial impact on the REM (Antonakakis & Florosc, 2016; Nguyen & Bui, 2019). The global financial crisis can increase the risk in the capital market, causing negative impacts on the REM (Golob, Bastic, & Psunder, 2012). Therefore, financial development and the global financial crisis can have a dramatical effect on the REM. However, there are a small number of studies which focus on the analysis of the impact of financial development on the REM, like the study by Lim (2018). Almost no research has extended the analysis of the impact of the global financial crisis on the REM. For this reason, the researchers carried out this study to create the first empirical evidence for the impact of financial development on the REM in case of the global financial crisis. Especially, the research data were collected in Vietnam, a developing country with the primary access to capital from real estate mortgages; accordingly, the impact of financial development on the REM may have its own characteristics, different from the research results in developed countries.

2. Literature review

Financial development might be defined as the development of the aggregate size of the financial sector and the efficiency of individual components in the financial sector. The participants in the financial sector playing an important role include central banks, commercial banks, finance companies, insurance companies, stock markets, pension funds, and other institutions in the financial market (Zaman, Izhar, Khan, & Ahmad, 2012). Therefore, financial development includes both stock market development and banking system development (Pradhan, Arvin, Hall, & Bahmani, 2014). The impact of financial development on the REM is expressed through the theory of wealth effect. The wealth effect has long been mentioned in the studies by Friedman (1957), Ando and Modigliani (1963). Recently, this effect has been mentioned a lot in empirical studies, especially in developed countries. According to the wealth effect theory, consumption is a function of total assets and disposable income. Total assets and income have a positive impact on consumer spending. Total assets include financial assets (stocks, bonds), real estate and other assets. Real estate is considered as both an investment and consumer goods (Kapopoulos & Siokis, 2005). The wealth effect suggests that the wealth of households and enterprises will determine their consumption and investment behavior. Financial development will increase the value of wealth (assets and income) of households and enterprises. They will feel richer, which leads to the increase in spending and investment. As a result, the demand for housing and the investments in the REM have also increased, which will increase real estate prices, contributing to the development of the REM. In contrast, when financial development declines, the wealth of households and enterprises decreases. To ensure safety in the long-term and balance revenues and expenditures, they will cut down on spending and investment, resulting in the decrease in the REM. Overall, financial development has a significant impact on the REM.

Recently, Lim (2018) has indicated that the growth rates of real estate prices in the countries with efficient financial development are lower than in the countries with poor financial development. This is because in the countries with poor financial development, loans are mainly through real estate mortgages, which contributes to the decrease in financial market imperfections. This finding is consistent with the previous views of Shen (2013), Beck, Georgiadis, and Straub (2014), Mallick, Matousek, and Tzeremes (2016). In addition, some views argue that there is a positive impact of banking system development (which is measured through the ratio of the domestic credit to the private sector to GDP) on the REM, for example, in the studies by Bunda and Zorzi (2010),

Hott (2011), Huang, Leung, and Qu (2015), Shen, Lee, Wu, and Guo (2016). Simultaneously, some studies also found the positive effect of stock market development (measured through the stock index) on the REM, for instance, in the studies by Ibrahim (2010), Ni and Liu (2011), Tsai, Lee, and Chiang (2011), Ding, Chong, and Park (2014), Lean and Smyth (2014), Huang et al. (2015).

The wealth effect also refers to the influence of the macro-economy on the aggregate demand in the market, including the demand for real estate. This is because the macro-economy has an impact on the wealth of households and enterprises. When the macro economy is beneficial, households and enterprises have many favorable conditions to increase the value of their wealth, which leads to the increase in the demand for housing and the investment in the REM. In view of this, Ibrahim (2010) found the positive impact of economic growth and consumer price index on the REM during the period of 1995:Q1-2006:Q4. In addition to domestic macroeconomic factors, the global financial crisis also has a significant impact on the REM. In fact, the global financial crisis may increase the risks in capital markets, causing negative impacts on the REM (Golob et al., 2012). The global financial crisis has enhanced worries for policy-makers in emerging countries, especially worriesabout the risk of a crisis in the REM in these countries (Zhang, Cai, Liu, & Kutan, 2016). In case of the crisis in the REM, real estate prices will decline, the ability to pay bank loans will be reduced (due to unpaid real estate loans and collateral not enough to pay off the loans), which may lead to the arrival of a financial crisis (Zhao, Zhan, Jiang, & Pan, 2017).

3. Data and methodology

Regarding the research data, the authors conducted data collection in Vietnam, which is a developing country with a relatively young real estate market and limited financial development. The research data were collected by the authors on a quarterly basis in the period from 2004:Q3 to 2018:Q4. The authors were only able to collect the data in this period because the Vietnamese real estate market was officially established after Vietnam's 2003 Land Law came into effect on July 1st, 2004. Therefore, the General Statistics Office of Vietnam is the only organization that publishes the data on the Vietnamese real estate market and these data were published on a quarterly basis in the period from 2004:Q3 to 2018:Q4.

The paper analyzed the impact of financial development on the REM, with the use of the ARDL model proposed by Pesaran, Shin, and Smith (2001). The ARDL model was also used in the study by Lean and Smyth (2014). The ARDL model has the advantage of being appropriate for empirical studies using time series data with a small number of observations and in the case that the data series are not stationary at the same level I(0) nor I(1), but no variable is stationary in the differential series I(2) (Tursoy & Faisal, 2016).

The researchers measured the REM through the index of the REM growth announced by the General Statistics Office of Vietnam. For financial development, we measured it through the banking system development (domestic credit to the private sector to GDP - DCP) and the stock market development (Vietnam stock index - SI). In particular, the authors measured the DCP variable thanks to the findings in the studies by Bunda and Zorzi (2010), Hott (2011), Huang et al. (2015), Shen et al. (2016), Lim (2018). Regarding the SI variable, the authors measured this variable thanks to the research results of Ibrahim (2010), Ni and Liu (2011), Tsai et al. (2011), Ding et al. (2014), Lean and Smyth (2014), Huang et al. (2015). Moreover, the researchers added the variable of the global financial crisis to the study to create novelty compared to the previous studies. According to Hui and Chan (2014), the global financial crisis began in August 2007. This financial crisis might last until March 2013 (Cayon, Thorp, & Wu, 2017). Therefore, the financial crisis (FC) was measured by the dummy variable; FC receives a value of 1 for the period of the global financial crisis (from 2007:Q3 to 2013:Q1) and receives a value of 0 for the remaining periods.

Accordingly, the model of the impact of financial development on the REM in Vietnam has the following equation:

$$\Delta REM_t = \alpha_0 + \sum_{j=1}^{k} \lambda_1 \Delta REM_{t-j} + \sum_{j=0}^{k} \lambda_2 \Delta DCP_{t-j} + \sum_{j=0}^{k} \lambda_3 \Delta SI_{t-j} + \sum_{j=0}^{k} \lambda_4 \Delta FC_{t-j} + \sum_{j=0}^{k} \lambda_5 \Delta GDP_{t-j} + \sum_{j=0}^{k} \lambda_6 \Delta CPI_{t-j} + \beta_1 REM_{t-1} + \beta_2 DCP_{t-1} + \beta_3 SI_{t-1} + \beta_4 FC_{t-1} + \beta_5 GDP_{t-1} + \beta_6 CPI_{t-1} + \varepsilon_t$$

Or:

$$\Delta REM_t = \alpha_0 + \sum_{j=1}^{k} \lambda_1 \Delta REM_{t-j} + \sum_{j=0}^{k} \lambda_2 \Delta DCP_{t-j} + \sum_{j=0}^{k} \lambda_3 \Delta SI_{t-j} + \sum_{j=0}^{k} \lambda_4 \Delta FC_{t-j} + \sum_{j=0}^{k} \lambda_5 \Delta GDP_{t-j} + \sum_{j=0}^{k} \lambda_6 \Delta CPI_{t-j} + \phi\, ECM_{t-1} + \varepsilon_t$$

Table 1. Suggested research model

Variable name	Code	Source	How to measure
Dependent variable			
Real estate market	REM	GSO	REM mainly focuses on business activities in the REM, including three main areas: Commerce, leasing offices or houses, and consultancy (brokerage).
Independent variable			
Domestic credit to the private sector	DCP	IMF	The domestic credit to the private sector to GDP.
Stock index	SI	SSC	Logarithm of Vietnam stock index: log(VN-Index).
Financial crisis	FC	Author's computation	The dummy variable of the FC receives a value of 1 for the period of the global financial crisis (from 2007:Q3 to 2013:Q1) and receives a value of 0 for the remaining periods.
Control variable			
Economic growth	GDP	GSO	Quarterly growth of gross domestic product.
Consumer price index	CPI	GSO	Quarterly growth of consumer price index.
Note: GSO: General Statistics Office of Vietnam. IMF: International Monetary Fund. SSC: State Securities Commission of Vietnam.			

4. Empirical results

4.1. Descriptive statistics
The research data were collected on a quarterly basis in the period from 2004:Q3 to 2018:Q4, with the variables described in Table 2 below:

Table 2. Descriptive statistics

Variable	Mean	Min	Max
REM	0.0288	-0.0134	0.0587
DCP	0.2460	0.0798	0.6321
VN-Index	566.4624	231.22	1094.08
FC	0.3966	0	1
GDP	0.0659	0.0314	0.0945
CPI	0.0831	0	0.279
Note: VN-Index: Vietnam stock index.			

Vietnam is a developing country, with a young stock market (officially operating on 28 July 2000); the banking system still plays a crucial role in providing credit to the financial market in Vietnam (Batten & Vo, 2016). Therefore, the mortgage of real estate for bank loans is the main activity.
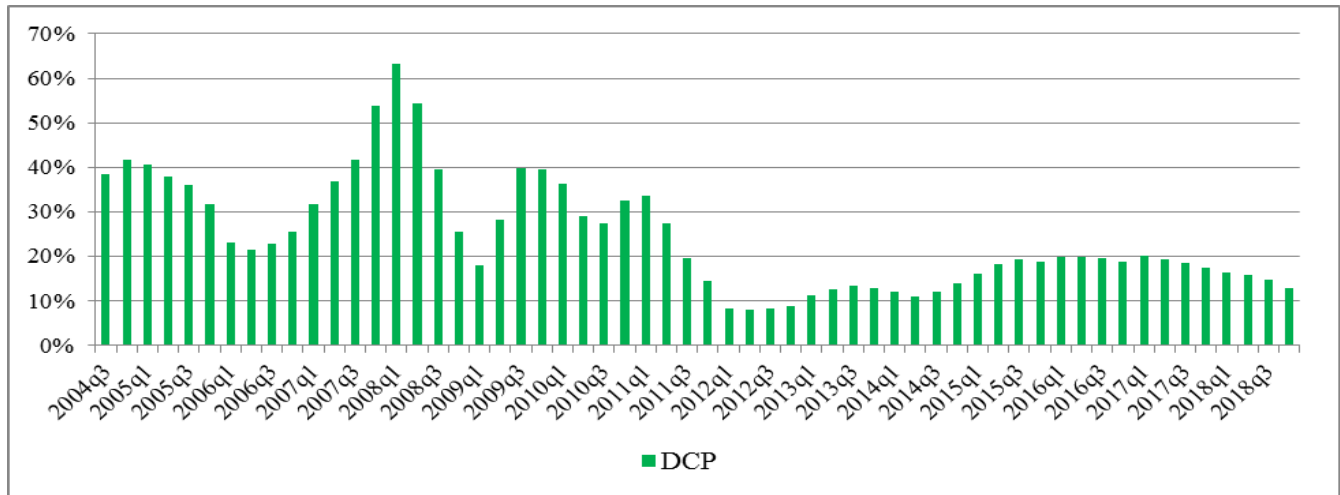
Figure 1. Growth of the domestic credit to the private sector (DCP)

DCP in Vietnam grew strongly in the first quarter of 2008, when the Vietnamese economy saw many positive signals with the expansion of production and business activities (Figure 1).
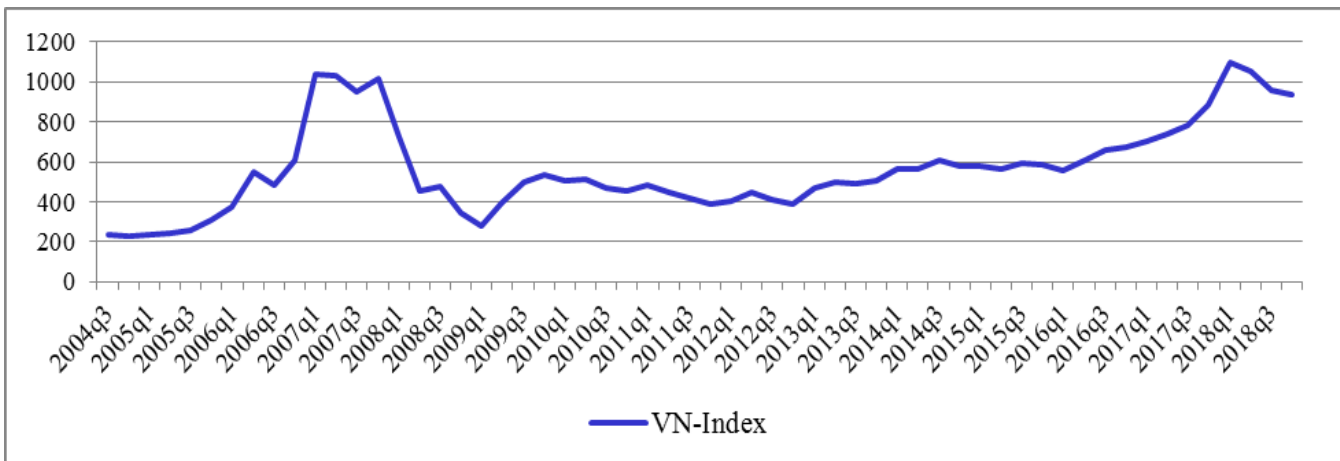
Figure 2. Vietnam stock index (VN–Index)

In 2007, with the positive signs from the fact that Vietnam officially became a member of the World Trade Organization (WTO), the Vietnam stock market grew hotly in the first quarter of 2007 (the stock index averaged 1035.589 points). Recently, Vietnam stock market peaked in the first quarter of 2018 (the stock index averaged 1094.08 points), exceeding the previous peak in the first quarter of 2007.
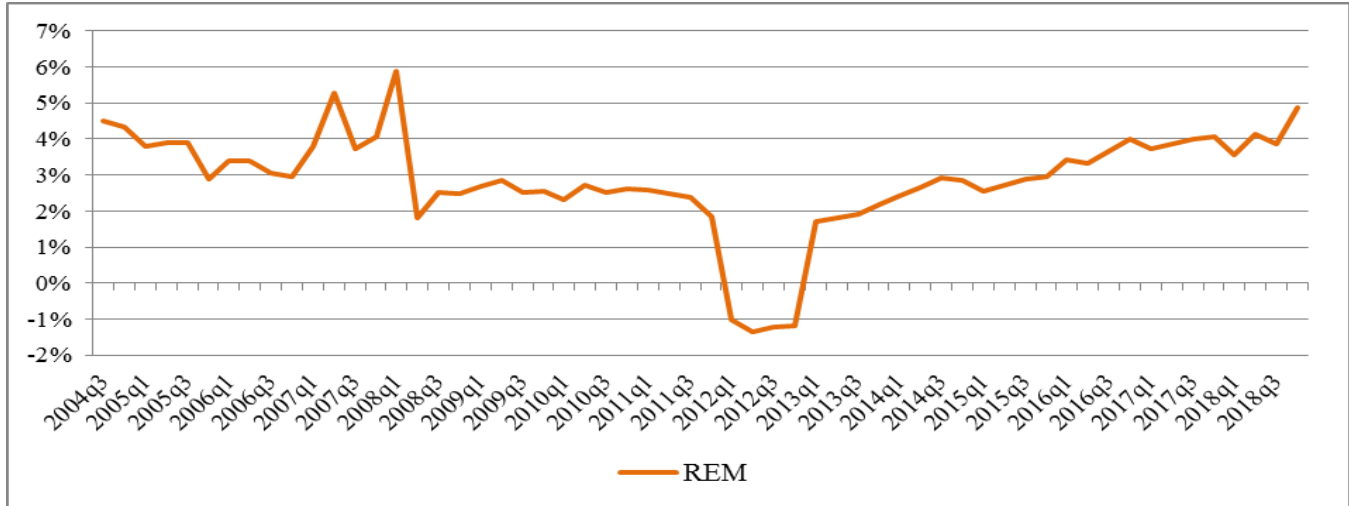
Figure 3. REM growth

With the hot growth from bank credit and the stock market, the capital into the REM amplified. This resulted in the high growth of the REM in the first quarter of 2008. However, after this period, with the negative impacts from the global financial crisis, the Vietnam REM plummeted. This decline lasted until the second quarter of 2012 because of the difficulties in accessing capital when the monetary policy tightened (Nguyen, Bui, & Nguyen, 2019). Recently, the world and domestic economies have recovered, which has contributed significantly to promoting the REM to grow again (Figure 3).

4.2. Unit root test

Table 3. Results of unit root tests

	REM	DCP	SI	GDP	CPI
AT LEVEL	0.1167	0.4706	0.3334	0.0449**	0.4612
AT Δ	0.0000***	0.0024***	0.0000***	0.0000***	0.0013***
Note: ** and *** indicate significance at the 5% and 1% level, respectively.					

The results of stationarity test suggested by Dickey and Fuller (1979) show that the variable of GDP is stationary in the I(0). In the meantime, the remaining data series are stationary in the I(1) at the 1% significance level (Table 3).

4.3. Cointegration test

The research paper measures the lag of variables in the ARDL model through the Bayesian Information Criterion (BIC). Bisgaard and Kulahci (2011) argued that identifying the optimal lag according to BIC is better than normal criteria. Furthermore, the paper also utilizes the bound test method recommended by Pesaran et al. (2001) to test the cointegration between the data series.

Hypothesis H_0: $\beta_1 = \beta_2 = \ldots = \beta_n = 0$ (there is no cointegration relationship between the data series).

Hypothesis H_A: $\beta_1 \neq \beta_2 \neq \ldots \beta_n \neq 0$ (there is a cointegration relationship between the data series).

Table 4. Results of the bound test of cointegration

F = 5.871			
p-value		I(0)	0.001[***]
		I(1)	0.006[***]
Note: [***] indicates significance at the 1% level.			

Table 4 shows that F is bigger than the I(1) proposed by Pesaran et al. (2001) at the 1% significance level. Therefore, there is a cointegration relationship between the data series at the 1% significance level.

4.4. Results of coefficient estimation

The analysis results regarding the impact of financial development on the REM according to the ARDL model are below:

Table 5. ARDL long-run and short-run results

| Variable	Coef.	Prob.
Long-run results		
DCP	0.1068	0.000[***]
SI	0.0404	0.001[***]
FC	-0.0195	0.000[***]
GDP	-0.1519	0.329
CPI	-0.0238	0.609
Short-run results		
△DCP	0.0981	0.002[***]
△DCP(-1)	-0.0876	0.003[***]
△SI	0.0280	0.002[***]
△FC	-0.0135	0.001[***]
△GDP	-0.1052	0.325
△CPI	-0.0165	0.608
ECM(-1)	-0.6923	0.000[***]
Constant	-0.0611	0.009[***]
R-squared	49.78%	
White's test	0.1319	
Breusch-Godfrey LM test	0.7428	
Ramsey Reset test	0.3839	
Note: [***] indicates significance at the 1% level.		
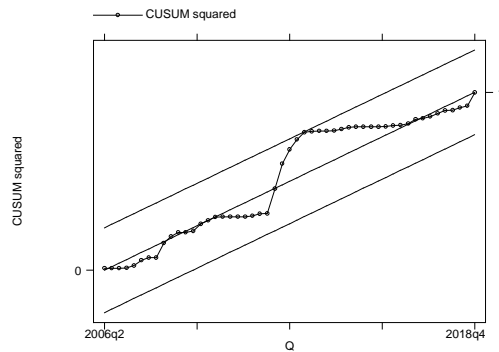
Figure 4. Plots of CUSUM squared statistics for coefficient stability tests

White's test shows that the research model has no homoscedasticity. Breusch-Godfrey LM test shows that the research model has no serial correlation. The Ramsey Reset confirmed that the functional form of the model does not suffer from omitted variables. Simultaneously, the paper conducted stability tests of the model through the CUSUM squared. The stability test suggested by Brown, Durbin, and Evans (1975) indicates that the CUSUM squared is within the standard range at the 5% significance level (Figure 4). Therefore, the research model has stability and appropriateness.

Table 5 shows that in the short and long term, the REM is impacted by financial development (DCP and SI) at the 1% significance level, and the impact is primarily positive. This impact is entirely consistent with the wealth effect theory. However, the REM is impacted greater by the DCP than by the SI. This is consistent with the reality because Vietnam is a developing country with the main capital into the REM stemming from the mortgage of real estate for loans. Therefore, it is understandable that the REM is strongly affected by the DCP. This result is consistent with the previous finding in the study by Lim (2018). In addition, at the 1% significance level, the researchers also find the negative impact of the FC on the REM in the short and long term. Meanwhile, the researchers have not found the statistically significant impact of GDP and CPI on the REM.

For the domestic credit to the private sector (DCP): In the short term, the DCP has a positive impact on the REM. However, with one lag, this direction tends to reverse. In the long term, the researchers also find the positive impact of the DCP on the REM. Therefore, the impact of the DCP on the REM is mainly positive. This suggests that the DCP plays an important role in increasing investments in the REM, thereby boosting the REM. This finding is consistent with the study by Bunda and Zorzi (2010), Hott (2011), Huang et al. (2015), Shen et al. (2016). Simultaneously, this finding is also consistent with the wealth effect theory. As a result, the DCP provided by the banking system may stimulate the development of the REM. However, if the capital in the REM increases excessively and is not strictly controlled, it can create a bubble phenomenon in the REM, and the occurrence of the global financial crisis in 2007 is a testament to this impact.

For the stock index (SI): In the short and long term, the SI has a positive impact on the REM at the 1% significance level. Therefore, when the stock market develops, investors in the stock market will increase their asset value and tend to increase the demand for housing and the investments in the REM. This will promote the development of the REM. This result is consistent with the previous findings in the studies by Ibrahim (2010), Ni and Liu (2011), Tsai et al. (2011), Ding at al. (2014), Lean and Smyth (2014), Huang et al. (2015). It can be said that the impact of the SI on the REM is completely consistent with the wealth effect theory.

For the financial crisis (FC): In the short and long term, the FC has a negative impact on the REM at the 1% significance level. Vietnam has achieved certain steps in the process of international integration. Therefore, it is inevitable that the REM is impacted negatively by the FC. When the global financial crisis appeared, the world and Vietnam economy faced many difficulties. The real estate transactions declined sharply and the real estate industry had difficulty in accessing capital. As a result, the REM would decline dramatically. The discovery of the statistically significant impact of the FC on the REM reflects the reality in Vietnam, and this is also a new finding of this research paper.

Conclusions

The paper shows the impact of financial development on the REM in both the short and long term, and the impact is mainly positive. In particular, the REM is impacted greater by the domestic credit to the private sector (DCP) than by the stock index (SI). This finding is completely consistent with the wealth effect theory. However, this finding represents the difference between Vietnam and developed countries, because the access to capital from the banking system plays a key role in developing countries like Vietnam. Simultaneously, with the analysis of the role of the global financial crisis, the paper achieves great success in finding the negative impact of the global

financial crisis on the REM in the short and long term, which is the new finding of this paper compared to the previous studies. This paper is the first empirical evidence in Vietnam for the impact of financial development on the REM. In addition, it is the first study to examine the role of the global financial crisis when analyzing the impact of financial development on the REM. Accordingly, the research results bring practical value to Vietnam. Furthermore, the research results also have important implications for the REM in the world's economies, especially for developing countries like Vietnam.

The research results show that financial development has an impact on Vietnam's REM in the short and long term, and the impact is mainly positive. In addition, the researchers find out the negative influence of the global financial crisis on the REM in the short and long term. Therefore, the world economy and the domestic financial development play a principalrole in Vietnam's REM. Thanks to that, the researchers suggest some policy implications as follows:

- The government of Vietnam should closely monitor the world economic situation, together with the improvement in the forecasts of the world economic situation. Thereby, there will be a foundation to apply suitable policies to boost the development of the economy and the REM in a sustainable way. In particular, it is essential to take advantage of the opportunities created by international economic integration and simultaneously to have appropriate policies to limit the negative impacts of the world economy.

- The government of Vietnam should also have an efficient policy on financial development, making the most of capital resources in the economy to stimulate the development of the REM. In particular, the government of Vietnam should attach considerable importance to the credit capital from the banking system and the capital resource from the stock market. However, it is necessary that the REM should develop in a sustainable way, meeting the actual demand in the market, and avoiding the formation of bubbles in the REM. This is because when bubbles are formed in the REM, the REM will be at risk of recession in the future. This will lead to negative effects on the economy, and the global financial crisis is a testament to this issue.

- This paper has achieved definite success in finding the first empirical evidence for the impact of financial development on the REM in Vietnam. However, this study also faces major limitations when it is impossible to collect data for each locality in Vietnam. Therefore, the researchers cannot analyze the impact of financial development on the REM in each locality. Meanwhile, each locality in Vietnam has its own characteristics of financial development as well as those of the REM. This is also a remarkable direction for further studies.

References

Ando, A.; Modigliani, F. 1963. The Life Cycle Hypothesis of Saving: Aggregate Implications and Tests, *American Economic Review,* 103(1): 55-84. Retrieved from: https://www.econ.nyu.edu/user/violante/NYUTeaching/MTA/Spring14/Readings/ando_aer.pdf

Antonakakis, N.; Florosc, C. 2016. Dynamic interdependencies among the housing market, stock market, policy uncertainty and the macroeconomy in the United Kingdom, *International Review of Financial Analysis*, 44: 111-122. https://doi.org/10.1016/j.irfa.2016.01.006

Batten, J.A.; Vo, X.V. 2016. Bank risk shifting and diversification in an emerging market, *Risk Management,* 18(4): 217-235. https://doi.org/10.1057/s41283-016-0008-2

Beck, R.; Georgiadis, G.; Straub, R. 2014. The finance and growth nexus revisited, *Economics Letters,* 124(3): 382-385. https://doi.org/10.1016/j.econlet.2014.06.024

Bencivenga, V.R.; Smith, B.D.; Starr, R.M. 1995. Transaction costs, technological choice, endogenous growth, *Journal of Economic Theory*, 67(1): 53-117. https://doi.org/10.1006/jeth.1995.1069

Bisgaard, S.; Kulahci, M. 2011. *Time Series Analysis and Forecasting by Example*. A John Wiley & Sons, Inc., Publication, 163-164.

Brown, R.L.; Durbin, J.; Evans, J.M. 1975. Techniques for Testing the Constancy of Regression Relationships Over Time, *Journal of the Royal Statistical Society,* 37(2): 149-192. Retrieved from: https://www.jstor.org/stable/2984889

Buera, F.J.; Kaboski, J.P.; Shin, Y. 2011. Finance and development: a tale of two sectors, *American Economic Review,* 101(5): 1964-2002. Retrieved from: https://www.aeaweb.org/articles?id=10.1257/aer.101.5.1964

Buera, F.J.; Shin, Y. 2013. Financial frictions and the persistence of history: a quantitative exploration, *Journal of Political Economy,* 121(2): 221-272. Retrieved from: https://www.jstor.org/stable/10.1086/670271

Bui, T.N. 2019. The Role of Financial Development in the Vietnam Economy, *WSEAS Transactions on Business and Economics*, 16: 471-476. Retrieved from: https://www.wseas.org/multimedia/journals/economics/2019/a985107-854.pdf

Bui, T.N. 2020. How does Financial Development Affect the Employment? Evidence from Asean Countries, *Journal of Management Information and Decision Sciences*, 23(1): 1-6. Retrieved from: https://www.abacademies.org/articles/How-does-financial-development-affect-the-employment-evidence-1532-5806-23-1-174.pdf

Bunda, I.; Zorzi, M.C. 2010. Signals from housing and lending booms, *Emerging Markets Review*, 11(1): 1-20. https://doi.org/10.1016/j.ememar.2009.09.003

Cayon, E.; Thorp, S.; Wu, E. 2018. Immunity and infection: Emerging and developed market sovereign spreads over the Global Financial Crisis, *Emerging Markets Review,* 34: 162-174. https://doi.org/10.1016/j.ememar.2017.11.006

Dickey, D.A.; Fuller, W.A. 1979. Distribution of the Estimators for Autoregressive Time Series with Unit Root, *Journal of the American Statistical Association*, 74: 427-432. https://doi.org/10.1080/01621459.1979.10482531

Ding, H.; Chong, T.T.L.; Park, S.Y. 2014. Nonlinear dependence between stock and real estate markets in China, *Economics Letters*, 124(3): 526-529. https://doi.org/10.1016/j.econlet.2014.05.035

Esso, L.J. 2010. Re-examining the finance-growth nexus: Structural break, threshold cointegration and causality evidence from the ECOWAS, *Journal of Economic Development*, 35(3): 57-79. Retrieved from: http://www.jed.or.kr/full-text/35-3/3.pdf

Friedman, M. 1957. *A Theory of the Consumption Function: A Study by the National Bureau of Economic Research*. Princeton University Press, Princeton.

Golob, K.; Bastic, M.; Psunder, I. 2012. Analysis of Impact Factors on the Real Estate Market: Case Slovenia, *Inzinerine Ekonomika (Engineering Economics),* 23(4): 357-367. https://doi.org/10.5755/j01.ee.23.4.2566

Hott, C. 2011. Lending behavior and real estate prices, *Journal of Banking & Finance,* 35(9): 2429-2442. https://doi.org/10.1016/j.jbankfin.2011.02.001

Huang, D.J.; Leung, C.K.; Qu, B. 2015. Do bank loans and local amenities explain Chinese urban house prices?, *China Economic Review*, 34: 19-38. https://doi.org/10.1016/j.chieco.2015.03.002

Hui, E.C.M.; Chan, K.K.K. 2014. The global financial crisis: Is there any contagion between real estate and equity markets?, *Physica A: Statistical Mechanics and its Applications*, 405: 216-225. https://doi.org/10.1016/j.physa.2014.03.008

Ibrahim, M.H. 2010. House price-stock price relations in Thailand: an empirical analysis, *International Journal of Housing Markets and Analysis*, 3(1): 69-82. https://doi.org/10.1108/17538271011027096

Kapopoulos, P.; Siokis, F. 2005. Stock and real estate price in Greece: wealth versus 'credit-price' effect, *Applied Economics Letters*, 12(2): 125-128. https://doi.org/10.1080/1350485042000307107

King, R.G.; Levine, R. 1993. Finance and growth: Schumpeter might be right, *The Quarterly Journal of Economics,* 108(3): 717-737. https://doi.org/10.2307/2118406

Lean, H.H.; Smyth, R. 2014. Dynamic interaction between house prices and stock prices in Malaysia, *International Journal of Strategic Property Management*, 18(2): 163-177. https://doi.org/10.3846/1648715X.2014.925006

Lim, T. 2018. Growth, financial development, and housing booms, *Economic Modelling*, 69: 91-102. https://doi.org/10.1016/j.econmod.2017.09.008

Mallick, S.; Matousek, R.; Tzeremes, N.G. 2016. Financial development and productive inefficiency: a robust conditional directional distance function approach, *Economics Letters,* 145: 196-201. https://doi.org/10.1016/j.econlet.2016.06.019

Moshirian, F.; Wu, Q. 2012. Banking industry volatility and economic growth, *Research in International Business and Finance,* 26(3): 428-442. https://doi.org/10.1016/j.ribaf.2012.01.004

Nguyen, M.L.T.; Bui, T.N. 2019. Stock market, real estate market, and economic growth: an ARDL approach, *Investment Management and Financial Innovations*, 16(4): 290-302. http://dx.doi.org/10.21511/imfi.16(4).2019.25

Nguyen, M.L.T.; Bui, T.N.; Nguyen, T.Q. 2019. Relationships between Real Estate Markets and Economic Growth in Vietnam, *Journal of Asian Finance, Economics and Business*, 6(1): 121-128. http://doi.org/10.13106/jafeb.2019.vol6.no1.121

Nguyen, M.L.T.; Xuan, P.T.T; Bui, T.N. 2020. Causal relationship between banking system development and real estate market, *Management Science Letters*, 10(1): 41-52. http://doi.org/10.5267/j.msl.2019.8.017

Ni, J.; Liu, J. 2011. *The study in house market and stock market in China-HongKong-US*, International Conference on Business and Economics Research, IACSIT Press, Kuala Lumpur, Malaysia, 71-75. Retrieved from: http://www.ipedr.com/vol1/16-B00027.pdf

Pesaran, M.H.; Shin, Y.; Smith, R.J. 2001. Bounds testing approaches to the analysis of level relationship, *Journal of Applied Econometrics,* 16(3): 289-326. https://doi.org/10.1002/jae.616

Pradhan, R.P.; Arvin, M.B.; Hall, J.H.; Bahmani, S. 2014. Causal nexus between economic growth, banking sector development, stock market development, and other macroeconomic variables: The case of ASEAN countries, *Review of Financial Economics,* 23(4): 155-173. https://doi.org/10.1016/j.rfe.2014.07.002

Shen, L. 2013. Financial dependence and growth: diminishing returns to improvement in financial development, *Economics Letters,* 120(2): 215-219. https://doi.org/10.1016/j.econlet.2013.04.018

Shen, C.H.; Lee, Y.H.; Wu, M.W.; Guo, N. 2016. Does housing boom lead to credit boom or is it the other way around? The case of China, *International Review of Economics and Finance*, 42: 349-367. https://doi.org/10.1016/j.iref.2015.10.008

Tsai, I.C.; Lee, C.F.; Chiang, M.C. 2011. The Asymmetric Wealth Effect in the US Housing and Stock Markets: Evidence from the Threshold Cointegration Model, *The Journal of Real Estate Finance and Economics*, 45: 1005-1020. https://doi.org/10.1007/s11146-011-9304-5

Tursoy, T.; Faisal, F. 2016. Causality between stock price and GDP in Turkey: An ARDL Bounds Testing Approach, *Romanian Statistical Review,* 64(4): 3-19. Retrieved from: https://econpapers.repec.org/article/rsrjournl/v_3a64_3ay_3a2016_3ai_3a4_3ap_3a3-19.htm

Zaman, K.; Izhar, Z.; Khan, M.M.; Ahmad, M. 2012. The relationship between financial indicators and human development in Pakistan, *Economic Modelling,* 29(5): 1515-1523. https://doi.org/10.1016/j.econmod.2012.05.013

Zhang, D.; Cai, J.; Liu, J.; Kutan, A.M. 2016. Real estate investments and financial stability: evidence from regional commercial banks in China, *The European Journal of Finance,* 6(1): 1-25. https://doi.org/10.1080/1351847X.2016.1154083

Zhao, S.X.B.; Zhan, H.; Jiang, Y.; Pan, W. 2017. How big is China's real estate bubble and why hasn't it burst yet?, *Land Use Policy*, 64: 153-162. https://doi.org/10.1016/j.landusepol.2017.02.024

Assoc. Prof. Dr. My-Linh Thi NGUYEN is working at the Faculty of Banking and Finance, University of Finance and Marketing (UFM). The main areas of research are public policy, public finance, real estate market, financial development. With over 15 years of experience in research and teaching in the field of finance, she has published nearly 70 articles. In addition, she also attended many international conferences, conducted as the head of 6 ministerial-level and provincial-level projects in Vietnam, participated in the National Foundation for Science and Technology Development, and many other provincial and ministry level projects. Author and co-author of 8 books including textbooks and monographs. She has participated in review for many Journals.
ORCID ID: https://orcid.org/0000-0001-7475-2502

Toan Ngoc BUI is a lecturer at Faculty of Finance and Banking, Industrial University of Ho Chi Minh City (IUH), Vietnam. He holds a Master of Finance and Banking from Ho Chi Minh City Open University, Vietnam. Currently, he is pursuing a PhD at University of Finance – Marketing (UFM), Vietnam. His researches are in the fields of finance, real estate market and applied econometrics.
ORCID ID: https://orcid.org/0000-0002-0595-3172

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

FISCAL GOALS OF REGULATING THE ACTIVITIES OF THE INSTITUTE OF CONTROLLED FOREIGN COMPANIES IN THE DIGITAL ECONOMY

Egor V. Dudukalov[1]*, Galymzhan O. Spabekov[2], Liudmila V. Kashirskaya[3], Andrei V. Sevbitov[4], Olga Yu. Voronkova[5], Lidia V. Vasyutkina[6]

[1]* Russian Presidential Academy of National Economy and Public Administration, Prospect Vernadskogo, 82, Moscow, 119571 Russian Federation
[2] Academy of Public Administration under the President of the Republic of Kazakhstan, Abay avenue, 33A, Nur-Sultan (Astana), Kazakhstan
[3]Financial University under the Government of the Russian Federation, Moscow, Leningradsky Prospekt, 49, 125993, Moscow, Russian Federation
[4]Sechenov First Moscow State Medical University, Trubetskaya st., 8-2, 119991, Moscow, Russian Federation
[5] Altai State University, Lenin Ave., 61, 656049, Barnaul, Russian Federation
[6] Bauman Moscow State Technical University, 2d Baumanskaya street, 5, building 1, 105005, Moscow, Russian Federation

E-mails: [1]* edudukalov@gmail.com (Corresponding author)

Abstract. At the OECD level, within the framework of taxation, relevant documents that directly concern the procedure for enhancing interaction and cooperation among its member states are being developed. The most important ones include the development of recommendations in the field of taxation of controlled foreign companies, including the study of current aspects in the event of a conflict between the provisions on controlled foreign companies and the concluded double taxation treaties. Meanwhile, in the study of the formation of the institute of controlled companies with regard to the manner of their formation and use of modern forms and methods of administrative control and tax liability, it is important to study actions in the sphere of international tax law. However, the emerging problems in this sphere are relevant, since, at the level of national legislation of each state, there are both objective and subjective factors that directly affect the formation of law enforcement practice on controlled foreign companies, with regard to a lack of scientific information in the context of national law. Therefore, in terms of improvement of the tax legislation of countries with developing economies that are reforming the institution of controlled foreign companies and supplementing them with new provisions which cover the basic aspects of the formation of taxation of controlled foreign companies in the digital economy, it is important to mention the urgent measures aimed at improving them, including ways of implementation and modernization of the rules and procedure for determining the profits of controlled foreign companies in terms of clarifying the list of passive taxes, as well as the composition of costs of such companies.

Keywords: tax residents; taxation in the digital economy; profit of controlled foreign companies; double taxation treaties

1. Introduction

The development of the global digital economy creates new challenges in the field of taxation and accounting, especially in relation to the regulation of the activities of the institute of controlled foreign companies. The use of various approaches to assessing the financial and economic activities of controlled foreign companies (CFCs) can provide sound tax control from the point of view of fiscal administration. What it involves is full compliance with the stages of control and verification of data for such categories of taxpayers (Alm, McKee, 2004), since in this case, it is possible to ensure that the assessment is performed at the appropriate level. As the basic criteria, the volume of assets generated and the amount of profit received can be used, as well as other indicators in the form of floor space, the number of staff, etc.

When recognizing for tax reasons in a particular jurisdiction, it is important to understand the established list of active and passive income, since other things being equal, a clear border between them may be insignificant (in the opinion of Brown & Petersen (2009). In this case, within a specific legal tax jurisdiction, taxpayers can manipulate the recognition of specific types of income (Comi et al., 2019), for example, when including in the tax base of a CFC the amount of profit received for ordinary activities or "conditional dividends" (Gryzunova & Ekimova 2018). Undoubtedly, this indicates significant problems that arise in terms of the qualification of income received under CFC within national jurisdiction, with regard to the current recommendations of the OECD, as well as subject to double taxation treaties.

2. Literature review

At the OECD activities level, relevant documents that directly concern the procedure for enhancing interaction and cooperation among its member states are being developed. In turn, an important stage is the development of tax rules for CFCs, including the development of recommendations in the case of contradictions between the provisions of the CFC and the concluded double taxation treaties (Perez-Alvarez et al., 2020).

The current provisions of the concluded OECD Convention include theoretical aspects of practical issues in the field of CFC taxation dealt with by economists and not fully developed. Thus, according to Porter (2003) studies, the legal rules of Luxembourg, Ireland, Belgium, and the Netherlands contain provisions contrary to the existing OECD conventions concerning the introduction of a permit for the taxation of CFC profits for persons being tax residents of third countries.

In turn, according to Becker et al. (2016) and Dzenopoljac et al. (2017), these provisions, introduced in the form of legal rules, are not restrictive for the parties to the transaction, as well as persons belonging to a CFC being tax residents in the case of taxation of third parties who are not tax residents of the mentioned states. Meantime, Arunraj & Ahrens (2015) research revealed an important component in relation to the CFC taxation procedure, since regardless of the effect of the residence factor of companies and individuals, the tax itself is calculated only in relation to the received amount of profit (Lehoux et al., 2018). These arguments are probably true. Therefore, the use of this approach for taxing the received amount of CFC profits in EU countries is irrespective of the parties to the transaction located in third countries, with respect to the existing double taxation agreements between the respective states and without the use of the right to tax the amount of "conditionally received dividends" (Abadie et al., 2004; Chae, 2015; Rahman and Bobkova, 2017).

It should be mentioned that in the context of digitalization of all spheres of the economy and taking into account the difficult macroeconomic situation in recent years, including the current one, primarily due to COVID-19, the problem of expanding the national tax law in relation to the taxation of CFCs (Edeigba et al., 2020) and narrowing the role of CFCs (Kiy & Zick 2020) arises for many states.

At least on a practical level, the existing double taxation treaties (DTTs) contain a reference to national legislation on the application of the right to income. This is about such countries as Canada (Article 91, Income Tax Law), France (Article 209, Tax Code). Simultaneously, exceptions on DTT are also contained in the tax laws of South Africa and Venezuela, Brazil, and Mexico. In this regard, in practice, the current CFC taxation procedure can be applied not only as a tool against "deferred taxation", as it was originally provided in the US legislation, and the goals and methods may be quite different. This is clearly stated in the OECD recommendations, since "they depend on whether a country adheres to the principle of export neutrality or import neutrality". Therefore, it is important to consider the further influence on cross-country relationships in the global digital economy when setting the ultimate goal of qualifying the recognition procedure for taxation of active and passive income at the level of national legislation.

3. Theoretical background

The study of the formation of the institute of controlled companies, taking into account the order of their formation and the use of modern forms and methods of administrative control in relation to the activities of CFCs, as well as implemented measures of tax responsibility, is an important aspect of the research performed by both theorists and practitioners in the field of international tax law. However, the emerging problems in this sphere are relevant, since, at the level of national legislation of each state, there are both objective and subjective factors that directly affect the formation of law enforcement practice in relation to CFCs, with regard to a lack of scientific information in the context of national law.

The global digital economy cannot be imagined without interconnected relations with major corporations (Korableva et al., 2018). In particular, the annual growth in the number of multinational corporations in the world that produce a significant number of goods (works, services) has significantly increased. Based on practical research data from Forbes' current rating of The World's Largest Public Companies, the top 100 largest multinational companies (MNCs) in the world for 2018 included 4 Russian companies: Gazprom, Sberbank, Rosneft, and Lukoil. The leading positions are occupied by MNCs that are actually located in the territory of the United States (30 corporations) and the PRC (21 corporations).

The current processes of economic integration directly concern the legislation of each country, on the basis of which financial relations are regulated with regard to the forms and methods of control over the activities of subjects of financial relations. Therefore, the current processes in the field of international finance should be controlled by the states, since this is necessary, first of all, in order to prevent tax violations. This is about increasing the potential for capital withdrawal to offshore jurisdictions and tax evasion by companies that operate in the international market (Fig. 1).
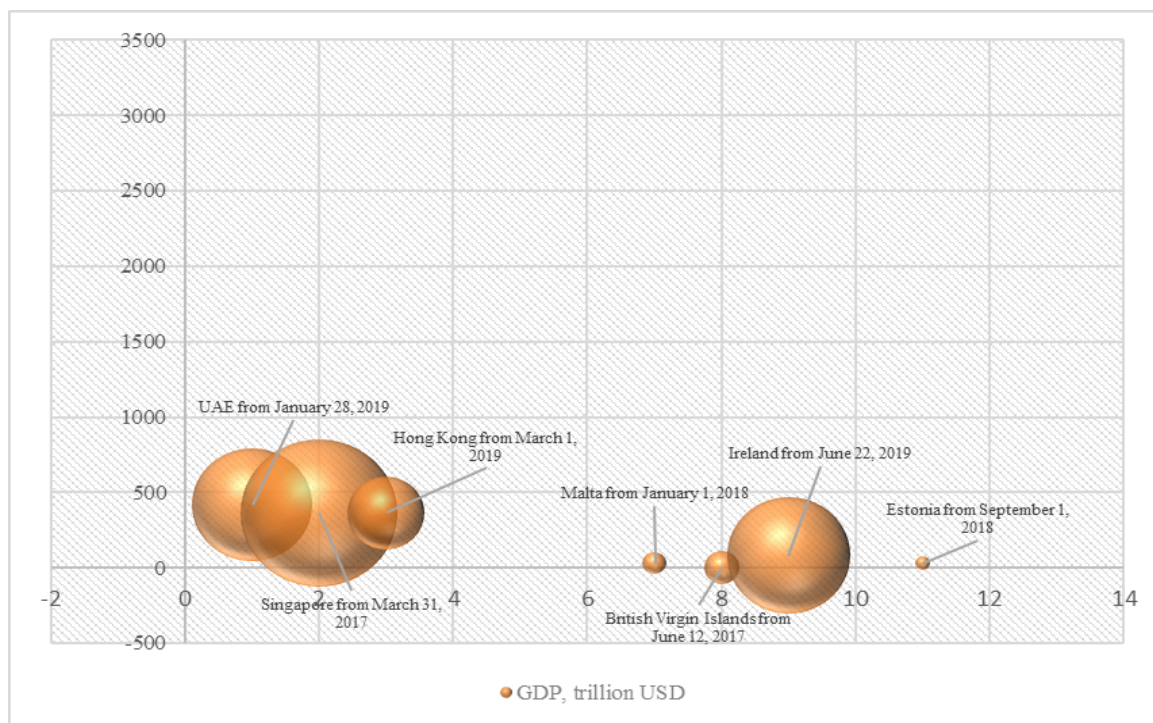
Figure 1. Comparative characteristics of separate offshore jurisdictions that maintain a register of beneficiaries and do not provide open access to the balance of current accounts about the final beneficiaries for 2019.
Source: Made by the authors based on information from https://knoema.ru/atlas and https://www.audit-it.ru

At the present stage, within the framework of globalization processes, there are stages on the way to the formation of special methods and forms of state financial control of such participants in financial relations. In the national tax practice, the appearance of provisions on CFCs since 2015 has had its own prerequisites both at the legislative level and in the form of economic grounds. At this time, like most countries, the Russian Federation initially provided the principle of separate taxation of profits received from organizations and shareholders/participants in the relevant legal entities, with regard to the principle of residency (Puryaev & Puryaev, 2020; Prodanova et al., 2019).

Thus, in Russia, as in the United States, when performing economic activities through the use of foreign companies, shareholders do not pay corporate income tax until this profit is distributed as dividends (until the amount of profit becomes the income of shareholders), or until the shareholders sell their shares in such a company. In this regard, before the adoption of the CFC tax rules, in Russia, in a similar way to the United States, the legislation allowed the possibility of evading national taxation through the creation of foreign companies with the participation of Russian shareholders.

In advanced economies, foreign company tax laws (CFC rules) are applied in various ways. Among them are: Australia, Great Britain, Germany, and the United States. In turn, the Russian rules for CFCs, which came into force in 2015, were constantly adjusted. Despite the more favorable nature of the amendments, the current approaches to CFC regulation have not been changed significantly, and adjustments have been made in respect of some shortcomings of the original version of the tax legislation.

Thus, within the framework of the national economy's deoffshorization being performed since 2014, the draft law on CFCs was a basic policy aimed primarily at establishing a mechanism for collecting and paying income tax in respect of controlled entities and companies (Abramova et al., 2014), as well as forming the procedure for recognizing legal entities as tax residents of the Russian Federation, with regard to the establishment of appropriate criteria, including the establishment of the procedure for "actual income beneficiary" when applying international double taxation treaties (Zhuravlev et al., 2019; Yemelyanov et al., 2020).

However, the peculiarity of the national legislation is that the profit received by a CFC is equal to the amount of profit received by the organization (individuals' income) recognized as the controlling person of this CFC. Meanwhile, the accounting for the CFC's profits is performed in accordance with the general procedure established by the provisions of national tax law, with certain features. The controlling entity includes legal entities or individuals with a share of more than 25% (before 2016 – 50%), or the participation rate of more than 10% if more than 50% of participating entities are recognized as tax residents of the Russian Federation. In certain cases provided by law, the CFC's profit is subject to tax exemption, in particular, if it belongs to non-profit organizations and is established in an EEU member state. In our opinion, the most relevant legal position is the procedure for calculating the amount of profit received within the CFC. For this, the following options for its definition are provided:
1)	based on financial statements (subject to certain conditions);
2)	according to the rules established for Russian companies based on the provisions of national tax legislation.

In determining the net profit received according to financial statements, it is important for taxpayers to comply with the following legal requirements: permanent location of the entity in relation to a foreign state with which the double taxation treaty is concluded or an audit report in respect of the statements without a negative opinion (refusal of opinion) is available. There are also certain types of legal requirements if the CFC's "personal law" does not establish rules for maintaining financial statements, or when a mandatory audit is not provided.
When determining the amount of profit received based on the application of national law, the necessary conditions must also be met for at least five subsequent tax periods. It is necessary to highlight that the amount of profit received from the CFC is subject to reduction by the amount of:
1)	dividends paid in the current tax period;
2)	tax paid in a foreign country. This operation should be document-wise, and if the Russian Federation does not have taxation agreement with the state (the location of the CFC), there should be provided a certification of the competent state authority.
The profit received from the CFC does not include the amount of profit aimed at increasing the authorized capital of the organization's participants. Another important aspect when establishing tax legislation in relation to CFC was the procedure for paying income tax on income received in the form of dividends from the CFC, if the amount of profit received from the corresponding CFC was previously reflected in tax return. In this case, taxpayers are required to provide regulatory authorities with payment documents confirming the payment of tax (Nagoyev, 2012).

Note that the established legal procedures related to the procedure for notification of participation in a CFC provide a general period for taxpayers – no later than 3 months from the date when the share of income received reached 10%. The opposite is also true: when the participation is stopped, the notification period will be the same. However, taxpayers are required to submit a CFC notification for the tax period no later than March 20 of the following calendar year. For its part, the tax service (if there is relevant information about such taxpayers) is obliged to send a corresponding request for explanations and notification about the CFC. Nevertheless, attention should be paid to the practical aspect of obtaining relevant legal information from Russian tax authorities in relation to the CFC, since the sources may include:
1.	Information contained in the notice provided by the taxpayer.

2.   Data received from the foreign competent authorities on the basis of an agreement on the exchange of tax information of the relevant state or on the basis of the OECD Convention on mutual administrative assistance in tax matters.

3.   When tax control measures are implemented by the local tax services within the framework of inspections connected with the collection of relevant evidence. When identifying the fact of control over a foreign company, the procedure for identifying the actual circumstances indicating such control is crucial. The following can be used for this purpose: witness statements, the results of the request/seizure of documents, other sources of information.

In this regard, it is necessary to analyze the greatest impact of existing tax and legal aspects in the qualification of active and passive income when regulating the determination of profits in respect of CFCs and their accounting for tax purposes.

4. Results

Based on the special report of the OECD adopted in 2015 in the form of "Designing Effective Controlled Foreign Company Rules", the most difficult aspect is the need to develop uniform unified rules for CFCs while maintaining freedom in relation to EU member states and the ability to develop their own regulations with regard to national specifics.

Certain it is that the established uniform approach in the field of legal regulation of CFCs in the EU countries is manifested in most member states on the basis of provisions that define:
 (1) concept of CFC and controlling person,
 (2) procedure for determining the main elements in relation to the taxation of CFC profits.

The OECD Report highlights current legislative approaches to regulating CFC taxation, including several main approaches that have the most practical application. The first option is a jurisdictional one, according to which the CFC tax regime is applied to companies based on their location with regard to the formation of a "white list" and "black list". The first refers to territories with high-tax jurisdictions, the second – to offshore or low-tax jurisdictions where the level of applicable tax rates is lower or even applies a rate of 0%, compared to the state of the controlling person. The jurisdictional approach is used in Germany, France, China, and other countries (Andersson, 2019). However, these states have different views regarding the criteria for the exercise of low-tax jurisdiction. For example, in France, a difference of 50% of the effective tax rate is set, while in Brazil there is no such order.

Another option is transactional, that is, the CFC tax regime is applied based on the type of activity performed by the CFC and the type of income received by the relevant company. In particular, in France, there are rules according to which the regime under consideration will not apply to a CFC if it is engaged in industrial activities (in other words, business).

When conducting a comparative analysis between the EU states and the procedure applied in the national jurisdiction of the Russian Federation with respect to the rules provided by the current tax legislation, the ratio to any of the mentioned options (approaches) is incorrect. In this case, the term "mixed approach" is preferable. I.e., with respect to the application of the jurisdictional approach, the main provisions related to CFC will apply. Especially emphasize that the application of a mixed approach is more characteristic of the German tax system, where only the passive income of a CFC is taxed, but at the same time, this type of income will be taxed if the effective tax rate for this type of income in the country of location of the CFC is less than 25% of the rate set in the country (Savitskiy, 2015).

Within the framework of the analysis of the most significant areas, with regard to the procedure for improving national legislation in the field of taxation of CFCs, it is important to highlight that significant changes have been made since 2019, which directly affected the current procedure for determining the profit of CFCs. In this regard, these provisions will be applied by the business for at least the next five tax periods, starting from 2020, so it is important to mention the most important ones. Since a number of changes have been made to the tax legislation in recent years related to the adjustment of the current procedure for applying the CFC rules in the field of taxation, these innovations, based on current practical experience, are harder in relation to the taxpayer, since they only increase control over it.

Within the main directions for improving the current legislation in the field of CFC taxation in the Russian Federation, it concerns an important provision in the procedure for determining CFC profits. Until the tax period of 2019 in determining the profits of a CFC, the income received in the form of dividends sourced from the Russian organization were not considered, but it was required to comply with the mandatory conditions: the controlling person for such a CFC should have had the actual right to dividends.

Based on changes made since 2019, when determining the profit of a CFC, the amount of passive income from Russian companies was not taken into account, if their actual recipient was a person controlling the CFC. The list of passive income includes loan interest, as well as royalties from the use of intellectual property.

As a comparative characteristic, the changes in the current tax procedure for CFCs will be considered through the example of Austria, which came into effect in 2019 relative to adjustments made for passive income received. The current CFC rules provide the inclusion of income in the tax base of an Austrian corporate shareholder who directly or indirectly owns a controlling stake in a foreign enterprise if such an enterprise generates passive income with a low level of taxation (offshore jurisdictions). However, tax control is performed if the Austrian company owns, directly or indirectly, with its subsidiaries more than 50% of the share rights or capital. The following types of CFC passive income are subject to mandatory inclusion in the tax base of the Austrian parent company from 2019, namely:

1) interest or other income from financial assets;
2) royalties or other income from intellectual property;
3) dividends and income from the disposal of shares;
4) income from financial leasing;
5) income from insurance, banking, and other financial activities;
6) income received when invoicing companies that receive income from the sale of goods (services) purchased and sold to associates, that do not contain their own added value (economic value) in their cost. In this regard, the list of passive income in the Russian and Austrian tax systems is different (Fig. 2).
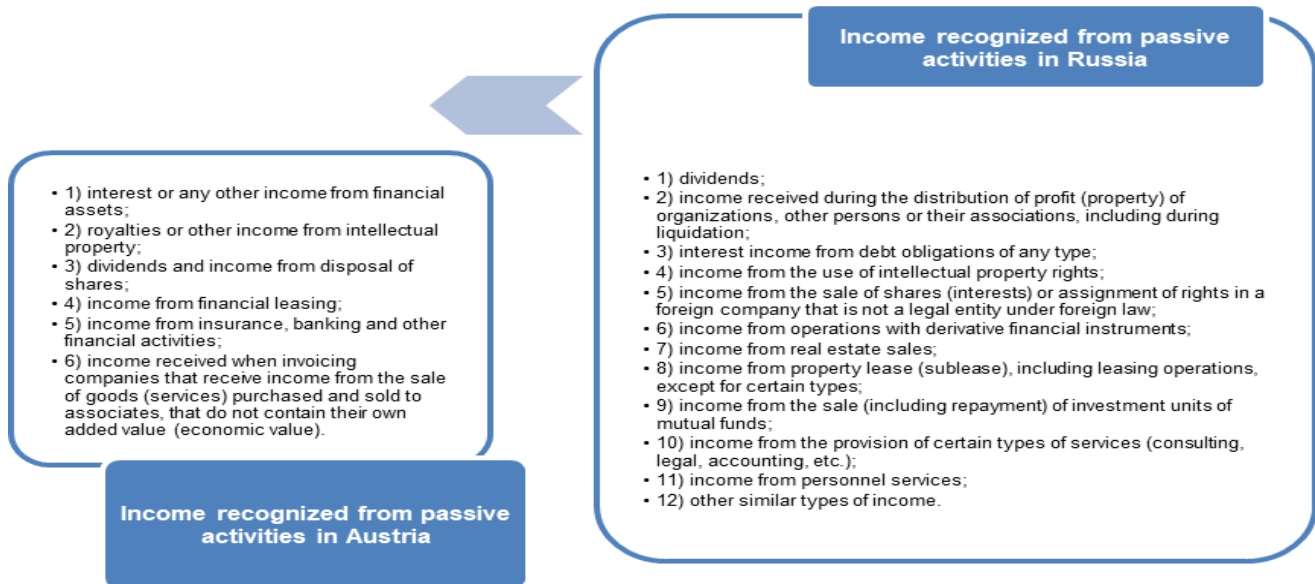
Income recognized from passive activities in Russia

- 1) dividends;
- 2) income received during the distribution of profit (property) of organizations, other persons or their associations, including during liquidation;
- 3) interest income from debt obligations of any type;
- 4) income from the use of intellectual property rights;
- 5) income from the sale of shares (interests) or assignment of rights in a foreign company that is not a legal entity under foreign law;
- 6) income from operations with derivative financial instruments;
- 7) income from real estate sales;
- 8) income from property lease (sublease), including leasing operations, except for certain types;
- 9) income from the sale (including repayment) of investment units of mutual funds;
- 10) income from the provision of certain types of services (consulting, legal, accounting, etc.);
- 11) income from personnel services;
- 12) other similar types of income.

- 1) interest or any other income from financial assets;
- 2) royalties or other income from intellectual property;
- 3) dividends and income from disposal of shares;
- 4) income from financial leasing;
- 5) income from insurance, banking and other financial activities;
- 6) income received when invoicing companies that receive income from the sale of goods (services) purchased and sold to associates, that do not contain their own added value (economic value).

Income recognized from passive activities in Austria

Figure 2. Comparative analysis of the types of income recognized from passive activities when making a CFC profit
Source: developed by the authors

5. Discussion

One of the important directions for improving the tax legislation in relation to CFCs is the inclusion of "capital amnesty" in the legal doctrine. This refers to the return to the national jurisdiction of the income of persons who do not live in the country for any reason (Almas, 2012). Nonetheless, according to Akamah et al. (2018), the tax incentive is the right for such categories of persons not to pay tax on the CFC's profits under the defined conditions.

A new direction in the studies of Coolidge (2012) is that in the case of a voluntary provision of CFC tax return by its controlling person (entity), the taxpayer will be exempt from penalties caused by delayed reporting. Besides, guarantees regarding the preservation of the CFC will be provided (apart from disclosure) if the CFC changes the country of registration, preserving all existing business relationships within specific jurisdiction through the procedure of re-domiciliation.

Therefore, in the authors' opinion, such a CFC can be registered as an international holding company (hereinafter IHC). However, with respect to statutory provisions, such a company shall make an investment in the national economy in the amount of not less than the threshold value (not less than 50 million rubles) within at least six months from the date of state registration of the respective company as an IHC. In this case, the capital amnesty procedure is a voluntary declaration in relation to a CFC, with regard to the provision of guarantees of exemption from penalties after redomiciling (Ferziger, 2013).

The conducted research aimed at improving the tax regulation of CFC activities has an important goal of stimulating the redomiciliation of CFCs into national jurisdiction only in special administrative regions located on Russky Island (Primorye Territory) and Oktyabrsky Island (Kaliningrad Region) for the purpose of obtaining the IHC status. It is important to take into consideration that, in practical terms, the redomiciliation procedure is possible not from all states (Leoncini et al., 2020). In particular, a company registered and operating in the territory of the British Virgin Islands (so-called BVI companies) cannot be re-domiciled (change of jurisdiction) to the Russian Federation directly. However, this is possible from other jurisdictions, for example, Cyprus (Akhmadeev et al., 2016; Akhmadeev et al., 2019). Therefore, in practical terms, it is possible to implement a two-stage redomiciliation from the British Virgin Islands through the jurisdiction of Cyprus.

Conclusion

According to the results of the study, it can be concluded that as part of improving tax legislation, countries with developing digital economy are reforming by adding new provisions regulating the basic aspects of the formation of CFC taxation. As for the Russian Federation, the main directions are to clarify the tax legislation for a more practical determination of the amount of profit received by a foreign company calculated in accordance with financial statements based on the company's personal law for the corresponding financial year. The term "personal law" originally referred to the operation of the legislation of the state, at the place of incorporation of the legal entity. At the same time, the profit received by a foreign company in foreign currency must be recalculated for the period based on the average exchange rate of the Bank of Russia. According to Bykanova et al. (2018) and Lehoux et al. (2019), this approach implied the formation of basic approaches to DE offshorization of the economy, according to which, the Russian legal doctrine established for the first time that the profits of foreign companies owed to Russian shareholders could be taxed even before the distribution as dividends (Ghosh & Maji, 2015).

An important tax change for taxpayers is also the consideration of the practical situation when interacting with offshore jurisdictions. These are cases when a CFC is registered in the territory of the relevant offshore territory and does not submit financial statements, and does not pay taxes. In this case, the CFC will not have the right to reduce the calculated profit tax. This approach of regulatory authorities has been analyzed when considering the general procedure for the interaction of companies with offshore jurisdictions and the list of states and territories that do not provide information exchange with national states for tax purposes is updated annually at the legislative level. In this regard, the following are the priority measures aimed at improving the legislation in the field of taxation of CFC activities.

First, the modernization of the rules and procedure for determining the CFC's profit in terms of clarifying the list of passive taxes, as well as the composition of the CFC's expenditures.

Second, the list of states and territories that do not exchange tax information with other jurisdictions should be periodically updated.

Third, the use of capital amnesty in the framework of voluntary provision of tax return of a CFC by its controlling individual, which will allow such a person (subject to a number of conditions) to be exempt from penalties that were caused by a violation of the reporting terms.

Fourth, the elimination of inconsistency of CFC rules in the EU countries, since the legal regulation of various areas of taxation reveals a trend leading to the gradual rejection of tax sovereignty in the European economic community, and against the background of quite consistent and successful unification of EU tax rules in specific areas, the problem of inconsistency of CFC rules in the national jurisdictions of EU member states remains unresolved and urgent. Therefore, the pursuit of a fiscal goal by the state in terms of regulating CFC legislation is

acceptable in the short term, while in the long term, it may have a negative impact on the country's economic development and, as a result, on the development of the digital economy in general.

References

Abadie, A., Drukker, D., Leber, Herr J., & Imbens, G. W. (2004). Implementing matching estimators for average treatment effects in Stata. The Stata Journal, 4(3): 290–311.

Abramova, M.A., Goncharenko, L.I. & Markina, E.V. (2014) Financial and monetary methods of economic regulation. Theory and practice, 4(21): 545-551

Akamah, H. T., Hope, O.-K., & Thomas, W. B. (2018). Tax havens and disclosure aggregation. Journal of International Business Studies, 49(1), 49–69.

Alm, J., & McKee, M. (2004). Tax compliance as a coordination game. Journal of Economic Behavior & Organization, 54(3), 297–312.

Almas, I (2012) International income inequality: measuring PPP bias by estimating engel curves for food. Am Econ Rev., 102(1): 1093–1117.

Andersson, J.J. (2019). Carbon taxes and CO2 emissions: Sweden as a case study. American Economic Journal: Economic Policy. 11(4): 1–30.

Akhmadeev, R.G., Bykanova, O.A. & Salomadina, P.S. (2019). The effect of the VAT change on the final consumer. Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, 765-770.

Arunraj, N. & Ahrens, D. (2015). A hybrid seasonal autoregressive integrated moving average and quantile regression for daily food sales forecasting. International Journal of Production Economics, 170: 321–335.

Akhmadeev, R.G., Kosov, M.E., Bykanova, O.A., Ekimova, K.V., Frumina, S.V. & Philippova, N.V. (2016). Impact of tax burden on the country's investments. Journal of Applied Economic Sciences, 11(5): 992-1002.

Becker, T., Illigen, C., McKelvey, B., Hülsmann, M. & Windt, K. (2016). Using an agent-based neural-network computational model to improve product routing in a logistics facility. International Journal of Production Economics, 174: 156–167.

Brown, J. & Petersen, B. (2009). Why has the investment-cash flow sensitivity declined so sharply? Rising R&D and equity market developments. Journal of Banking & Finance, 33: 971–984.

Bykanova, O.A., Akhmadeev, R.G., Glubokova, N.Y. & Kravchuk, I.S. (2018). The global market of roundwood: Financial aspects. Bulgarian Journal of Agricultural Science, 24(1): 8-16.

Chae, B. (2015) Insights from hashtag supplychain and twitter analytics: considering twitter and twitter data for supply chain practice and research. International Journal of Production Economics, 16(5): 247–259.

Comi, S., Resmini, L., & Vittucci, M.G. (2019). The impact of regional export promotion policies in Italy: the case of Lombardy. Scienze Regionali, 18(2): 215–235.

Coolidge, J. (2012). Findings of tax compliance cost surveys in developing countries. eJournal of Tax Research, 1: 250–287.

Dzenopoljac, V., Yaacoub, C., Elkanj, N. & Bontis, N. (2017). Impact of intellectual capital on corporate performance: evidence from the Arab region. The Classical Journal, 18(4): 884–903.

Edeigba, J., Gan, C. & Amenkhienan, F. (2020). The influence of cultural diversity on the convergence of IFRS: evidence from Nigeria IFRS implementation. Review of Quantitative Finance and Accounting, 55: 105–121 https://doi.org/10.1007/s11156-019-00837-0

Ferziger, A.S. (2013). From Lubavitch to Lakewood: The "Chabadization" of American Orthodoxy. Modern Judaism: A Journal of Jewish Ideas and Experience, 33 (2): 101–124.

Ghosh, S.K. & Maji, S.G. (2015). Empirical validity of value added intellectual coefficient model in Indian knowledge-based sector. Global Business Review, 16(6): 947–962.

Gryzunova, N.V., & Ekimova, K.V. (2018). Monetary policy and economy: Transmission channels and business competitiveness. Espacios, 39(19): 7-14

Korableva, O. N., Kalimullina, O. V., & Mityakova, V. N. (2018). Innovation activity data processing and aggregation based on ontological modelling. Paper presented at the *2018 4th International Conference on Information Management, ICIM 2018,* 1-4. https://doi:10.1109/INFOMAN.2018.8392659

Kiy, F. & Zick, T. (2020). Effects of declining bank health on borrowers' earnings quality: evidence from the European sovereign debt crisis. Journal of Business Economics, 90, 615–673. https://doi.org/10.1007/s11573-020-00968-0

Lehoux, L., Duck, H., Akhmadeev, R., Morozova, T. & Bykanova, O. (2019). Sustainable development facets: Taxation solutions for the energy industry. Journal of Security and Sustainability Issues, 9(2): 457-472. http://doi.org/10.9770/jssi.2019.9.2(8)

Lehoux, L., Morozova, T.V., Safonova, E.G. & Kalacheva, O.N. (2018). Adaptation of individual taxonomy in financial statements prepared in line with IFRS to XBRL format. Proceedings of the 32nd International Business Information Management Association Conference, IBIMA 2018 - Vision 2020: Sustainable Economic Development and Application of Innovation Management from Regional expansion to Global Growth, 2048-2055.

Leoncini, R., Vecchiato, G. & Zamparini, L. (2020). Triggering cooperation among firms: an empirical assessment of the Italian Network Contract Law. Economics & Politics, 37: 357–380. https://doi.org/10.1007/s40888-019-00141-z

Nagoyev, A.B. (2012) Priorities of modernization of economy of the North-Caucasian Federal District. Creative Economics, 2 (12): 265-272.

Perez-Alvarez, J.M., Gomez-Lopez, M.T., Eshuis, R. (2020). Verifying the manipulation of data objects according to business process and data models. Knowledge and Information System. 62: 2653–2683 https://doi.org/10.1007/s10115-019-01431-5

Prodanova, N. A., Plaskova, N. S., Dikikh, V. A., Sotnikova, L. V., Nikandrova, L. K., & Skachko, G. A. (2019). Techniques for assessing the investment attractiveness of a commercial organization based on classical methods of strategic economic analysis. International Journal of Economics and Business Administration, 7(4), 35-46. https://doi.org/10.35808/ijeba/330

Porter, M.E. (2003). The Economic Performance of Regions. Regional Studies, 37 (6-7): 549–578.

Puryaev, A., & Puryaev, A. (2020). Evaluating the Effectiveness of Projects of Global and National Economic Significance Level. In Smart Innovation, Systems and Technologies (Vol. 172, pp. 317–331). Springer, Singapore. https://doi.org/10.1007/978-981-15-2244-4_29

Rahman, P. A., & Bobkova, E. Y. (2017). The reliability model of the fault-tolerant border routing with two Internet services providers in the enterprise computer network. *Journal of Physics: Conference Series*, 803(1). https://doi.org/10.1088/1742-6596/803/1/012124

Savitskiy, A.I. (2015) Controlled foreign companies: foreign experience and prospects in Russia, Law. 2: 37–39.

OECD (2015), Designing Effective Controlled Foreign Company Rules, Action 3 – 2015 Final Report, OECD/G20 Base Erosion and Profit Shifting Project, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264241152-en. Para. 6. P. 13.

Yemelyanov, V. A., Yemelyanova, N. Y., Shved, E. V., Nedelkin, A. A., & Rubak, E. O. (2020). Object-oriented design of the specialized software for automation of the metallographic analysis. Paper presented at the Proceedings of the 2020 IEEE Conference of Russian Young Researchers in Electrical and Electronic Engineering, EIConRus 2020, 556-559. http://dx.doi.org/10.1109/EIConRus49466.2020.9039284

Zhuravlev, P., Poltarykhin, A., Sharagin, V., Vorobyeva, V., Bezveselnaya, Z., & Khodos, D. (2019). Economic aspects of human capital development in the context of renewable energy. Journal of Environmental Management and Tourism, 10(7), 1678-1686. http://doi.org/10.14505/jemt.v10.7(39).24

Egor DUDUKALOV

PhD in Economics, Dean, Faculty of Management, Russian Presidential Academy of National Economy and Public Administration. Research interests: Digital Economy, Digitalisation, Industry 4.0, Development of Science and Education, Formation of Political and Administrative Elites, Economic Globalization.

ORCID ID: https://orcid.org/0000-0002-6653-0026

Galymzhan SPABEKOV

Doctoral student of the Academy of Public Administration under the President of the Republic of Kazakhstan. Permanent place of work: deputy akim (head of administration) of Temirtau town, Karaganda region, Republic of Kazakhstan of economic issues. Research interests: public administration, state regulation of the economy and finance, industry, entrepreneurship and agriculture, land relations, public procurement.

ORCID ID: https://orcid.org/0000-0001-7249-1468

Liudmila KASHIRSKAYA

Professor, Doctor of the Economic Sciences, Financial University under the Government of the Russian Federation. Research interests: accounting expertise, state financial control, audit, departmental interaction, efficiency of activity.

ORCID ID: https://orcid.org/0000-0002-0234-0223

Andrei SEVBITOV

Doctor of Medicine, Professor, Head of the Department of propaedeutics of dental diseases of the Institute of Dentistry of Sechenov University. Currently engaged in teaching dentistry, as well as conducts research in the field of team management, corporate reporting.

Research interests: management in dentistry, internal control systems, implementation of financial plan performance indicators.

ORCID ID: https://orcid.org/0000-0002-8247-3586

Olga VORONKOVA

Doctor of Economics, Professor of management, business organization and innovation Department, Altai state University. Has the status of an expert of the Eurasian technological platform "Technologies of food and processing industry of agriculture – healthy food". Research interests: sustainable development of territories, innovation, technological and social entrepreneurship, "green" economy.

ORCID ID: https://orcid.org/0000-0002-3106-4643

Lidia VASYUTKINA

PhD in Economics, Associate Professor at the Department of Financial Management and Financial Law.

Bauman Moscow State Technical University. Research interests: accounting, analysis and audit. Economy and management of the national economy.

ORCID ID: https://orcid.org/0000-0003-2649-2886

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

TRANSITION MATRIX AND STOCHASTIC KERNEL FOR REPEATABILITY ASSESSMENT OF PERFORMANCE OF POLISH OPEN PENSION FUNDS[*]

Rafał Buła

University of Economics in Katowice, 1 Maja 50, 40-287 Katowice, Poland

E-mail: rafal.bula@ue.katowice.pl

Abstract. This study focuses on the issue of repeatability and reversal of performance achieved by Polish open pension funds. For the choice of the fund investing the contributions of the future pensioner, the phenomenon of repeatability and reversal of its performance is essential. Otherwise, historical rates of return cannot be used to predict future ones, and in that case the only rational method of choosing a pension fund is a pure random selection. Contrarily to the other studies taking into account numerous variables describing open pension funds, the author analyzes the only one variable interesting from a future pensioner's viewpoint: rate of return. As a consequence the formulated conclusions are not flawed due to considering factors having no influence on future pensioners' wealth. The analysis of these phenomena was carried out by adopting the dynamics of distribution testing methods. The estimated Markovian transition matrix and the conditional density function allowed us to formulate the conclusion about the weak performance repeatability of pension funds.

Keywords: pension fund; Markov chain; performance repeatability; transition matrix; stochastic kernel

1. Introduction

One of the consequences of the controversial Polish pension system reform carried out in the 1990s (sometimes called "the privatization of the pension system") (Żuk & Żuk, 2018) was the emergence of a new category of financial market participants – open pension funds (Góra, 2018), (Góra & Rutkowski, 1998). Their essential function is, above all, the investment of funds received in the form of contributions to achieve the maximum level of security and profitability of investments (Styczeń & Gomułka, 1999). Since every investment activity is subject to riskiness, it has become necessary to introduce legal solutions to protect future pensioners from taking unacceptably excessive risks and inefficient management of the investment portfolio leading to pensioners' wealth erosion (Parvi, 2014). To this end, the legislature provided the fund members with the possibility to

---

change the fund and specified the minimum rate of return that the fund must achieve in order to be able to continue operating (Kominek, 2012; Kompa & Wiśniewski, 2015a). Competition between funds was to lead to the exclusion of inefficient entities, the anticipated creation of new funds was to prevent market monopolisation while legal regulations were to diminish the agency problem (Samborski, 2014). Without determining whether the described mechanism actually works (see, for example, (Brzeszczyński, Bohl, & Serwa, 2019; Chybalski, 2008, 2012; Witkowska & Kompa, 2017; Witkowska, Kompa, & Mentel, 2019)), it should be noted that for the choice of the entity investing the contributions of the future pensioner, the phenomenon of repeatability and reversal of the pension fund performance is vital. Otherwise, historical rates of return cannot be used to predict future performance, and then the only rational method of choosing a pension fund is a pure random selection. Therefore, the scientific purpose of this study is to examine the hypothesis that the performance of open pension funds operating on the Polish market is characterised by repeatability.

By repeatability of pension fund performance it is meant delivering consistently good (repeatability of success) or bad performance (repeatability of failure) in subsequent periods. There is also an opposite phenomenon to repeatability – reversal, i.e. obtaining good performance after recording bad one or bad performance after good one. The described behaviour of rates of return enables systematic achievement of better performance than others by making the proper selection of the fund or by changing it. If the phenomenon of repeatability or reversal does not occur, then forecasting the future value of accounting units is not effective and does not lead to an above average increase in future retirement benefits.

Despite significance of the raised issues not only for future pensioners, but for the whole economy, the described problem has not been thoroughly investigated. The conducted research in this field of study has been mainly devoted to the static analysis of efficiency of open pension funds. As a consequence various types of comparisons between performance of open pension funds and mutual funds, multitude of benchmark indices as well as obligatory social security fund have been presented in the literature. Unfortunately, this type of analysis is of purely static nature – it informs about past events, but the linkage between future and the past is lost. Without any additional assumptions about intertemporal relations between performance of open pension funds, the future pensioner is in reality unable to make any rational decision. It is naturally possible to assume tacitly that the future will resemble the past, but without any empirical evidence it simply becomes the classic induction problem, unsolved since it was stated by David Hume (Duignan, 2007). Alas, there are practically no empirical inquiries tackling this issue in case of Polish open pension funds. The existing research gap will be covered in this study.

There are many methods for studying the phenomenon of performance repeatability. Many of them were created in order to indirectly verify the hypothesis of strong efficiency of the capital market stating that all information (even confidential) is reflected in the prices of financial instruments (Fama, 1970). Efforts were made to prove that entities suspected of having insider information, i.e. investment and pension funds, are not able to systematically achieve better performance than the market. Although this approach is criticised by proponents of behavioural finance, it has provided many valuable tools to study the repeatability phenomenon. These include methods of distribution dynamics analysis used in this study. The novelty of the research is the application of the distribution dynamics analysis to the performance of Polish open pension funds, what has not been done before. As a result, the new and interesting results can be obtained and conclusions germane to participants of the Polish open pension funds scheme formulated.

The paper is organized as follows. Section 2 describes the capital pillar of Polish pension system – its history, investment policy of open pension funds and their performance. Section 3 includes the literature review regarding the efficiency of open pension funds. Section 4 describes theory of Markov chains and concept of stochastic kernel applied in this study as well as data analysed. Section 5 presents results obtained and discussion while the last section concludes.

2. Polish open pension funds market

The reform of the Polish pension system formally began in January 1999. The implementation of this fundamental change to then existing social security system was forced by necessity of controlling its finances in the short term as well as dramatically worsening long-term aged dependency ratio. Mere continuation of the PAYGO scheme became impossible as retirement spending in 1990-1994 increased from 8.5% to 15.6% of GDP and the "positive demographic dividend" transformed into "negative demographic dividend" (Błaszczyk, 2020). As a consequence a three-pillar system was created by adding to the obligatory PAYGO system (modified by introducing defined contribution scheme instead of defined benefit scheme) two additional capital pillars: one mandatory and the facultative third one. Connecting the amount of the future pension with individual contributions of workers during period of their labour activity was to lead the whole pension system to become self-financing in the long-term to reduce the burden to public finances.

The entities intended to manage the contributions paid in to the capital pillar of the pension system (initially 7.3% of gross salary vs. 12.2% charged by the Social Security Institution responsible for governing the first pillar fund) were the open pension funds (*otwarte fundusze emerytalne*, OFE). According to the intentions of the reform's authors transforming workers into participants of the open pension funds market should have created incentives for managers to maximize wealth of contributors due to heavy competition between them (Bugaj, 2018). It was strongly believed that the capital pillar would outperform the mandatory PAYGO first pillar and result in significant growth of future pensions. Moreover, the predicted additional supply of funds should have led to accelerated development of domestic capital market.

From today's perspective the history of open pension funds in Poland can be divided into three periods: the period of dynamic development (1999-2011), the transitory period (2011-2014) and the period of stagnation (2014-2020). They are analysed using such measures of development of open pension funds market like number of members, value of net assets or number of funds (Chybalski, 2005).

During the first period of existence the number of members of open pension funds rose rather steadily while the market was consolidating as number of operating pension funds fell from 20 in 1999 to 14 in 2011.
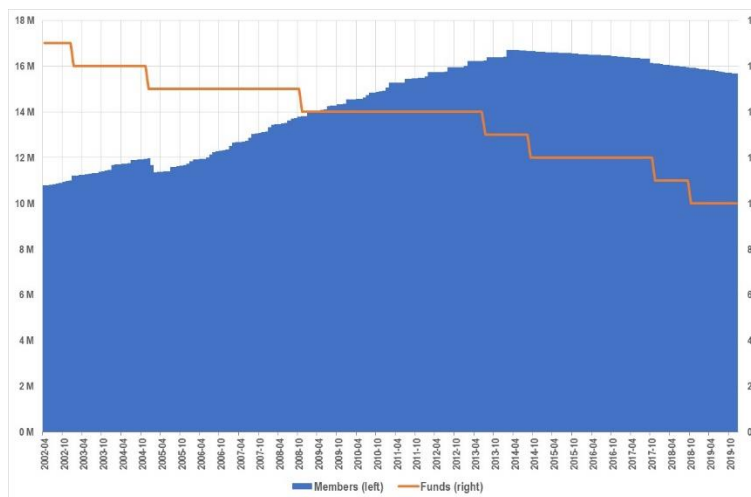

Fig. 1. Number of members of open pension funds and operating pension funds in Poland

Source: Own elaboration based on data provided by Financial Supervision Authority

The average contribution to the capital pillar of pension system remained constant at relatively high level. Consequently, at the same time a strong increase in net assets of open pension funds could have been observed (20.4% p.a.), partially due to steady inflow of contributions and partially as an effect of rising financial market. The first significant doubt about the shape of capital pillar of pension system was connected with global financial crisis 2007-2009 (Kołodziejczyk, 2019). The rapid decline of prices wiped off a substantial part of future pensioner's wealth and raised question about level of risk open pension funds participants were exposed to. The inflow of contributions was counterweighted by plummeting asset prices and as a result net assets of open pension funds declined slightly despite still increasing number of participants. Moreover, as the crisis put public finances under heavy pressure, a discussion regarding the efficiency of the existing reformed pension system and its influence on public debt became widespread.

Fig. 2. Net assets of open pension funds and their share in GDP

Source: Own elaboration based on data provided by Financial Supervision Authority

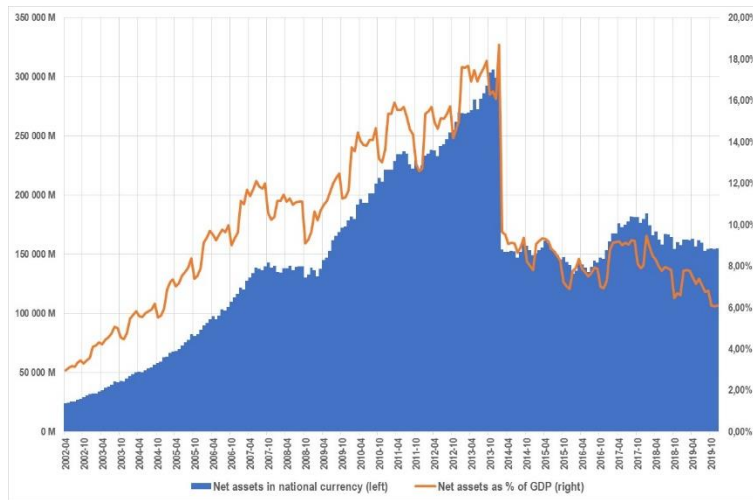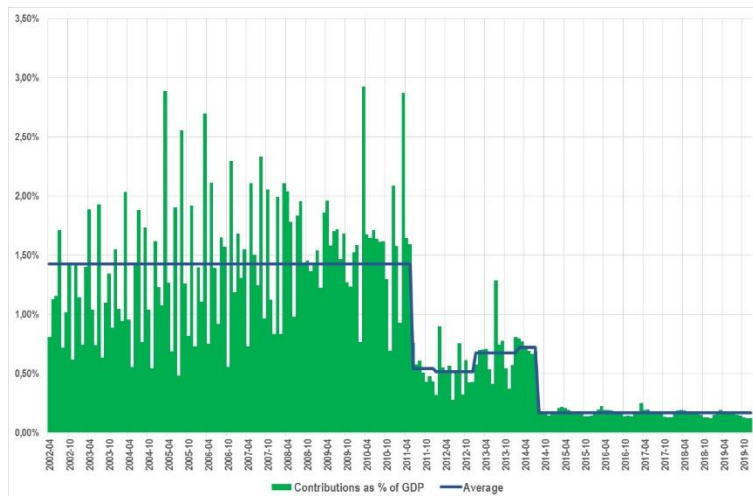**Fig. 3.** Contributions paid in to open pension funds as share in GDP

Source: Own elaboration based on data provided by Financial Supervision Authority

After the crisis the combined effect of growing financial markets and increasing contributions due to the economic recovery resulted in fast growth of funds' assets and continuation of the trend in case of the number of

987

the members. Nevertheless, the undermined trust in capital pillar of the pension system and budget difficulties led the government to gradual reduction of the open pension funds sector (Chybalski, 2014; Gubernat, 2013; Jakubowski, 2016). Firstly, in May 2011 the contribution to the open pension funds was reduced by 68% (from 7.3% of gross salary to 2.3%) and the difference started to be transferred to Social Security Institution. Additionally, the investment limits of open pension funds were changed to allow them to gradually invest more funds in equities (we do not discuss here changes to the remaining pillars of the pension system, e.g. the raised minimum retired age, as they are not explicitly connected with functioning of open pension funds). Secondly, in February 2014 net assets of open pension funds were reduced by 51.5% due to transferring them to Social Security Institution (government bonds and government-backed securities) and at the same time funds were disallowed to invest in these types of instruments in the future. Also the obligation of investing at least 75% of assets in shares was introduced and the limits regarding investing in more risky types of instruments as well as foreign ones were liberalized. Moreover, the open pension funds participants were given the possibility of choosing once again whether they wanted to continue to contribute to the capital pillar of the system or the whole contribution should be transferred to the Social Security Institution. Only about 15.4% members decided to contribute to open pension funds (Błaszczyk, 2020). This meant radical diminution of the amount of contributions paid in to the funds (the existing assets were not withdrawn from open pension funds) despite a slight increase in the level of the individual contribution (2.92% of gross salary). Finally, the funds were obliged to gradually transfer assets of their participants starting from 10 years before reaching retirement age to the Social Security Institution. The effects of the abovementioned changes are perfectly visible on fig.2 and fig.3.
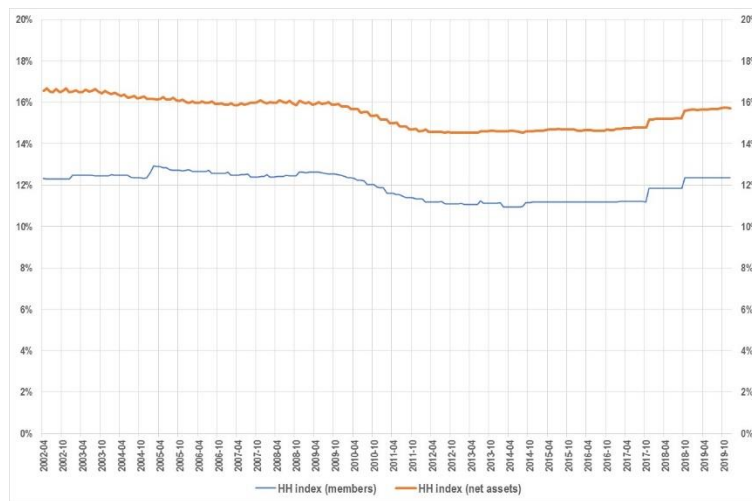

Fig. 4. Herfindahl-Hirschman index for open pension funds

Source: Own elaboration based on data provided by Financial Supervision Authority

The last period of existence of open pension funds lasting from 2014 till now is characterised by slow erosion of importance of open pension funds. The falling number of these entities (reduction from 20 by half) still manage relatively large funds (now concentrated on the stock market), but due to small group of active members (i.e. paying in contributions) and gradual withdrawal of funds of retiring participants their net assets are continuously declining. The values of Herfindahl-Hirschman index (Rhoades, 1993) show that despite this decline, the open pension funds market did not become more monopolistic (as relatively small funds disappeared from the market).

The future remains unclear. It was almost decided by the government that open pension funds would be converted into specialized open investment funds and only voluntary payments by their participants would be allowed (while still having option of transferring all pension savings to special fund administered by Social Security

Institution). The agreed time to introduce these changes was summer 2020, but due to the SARS-CoV-2 pandemic they were postponed.
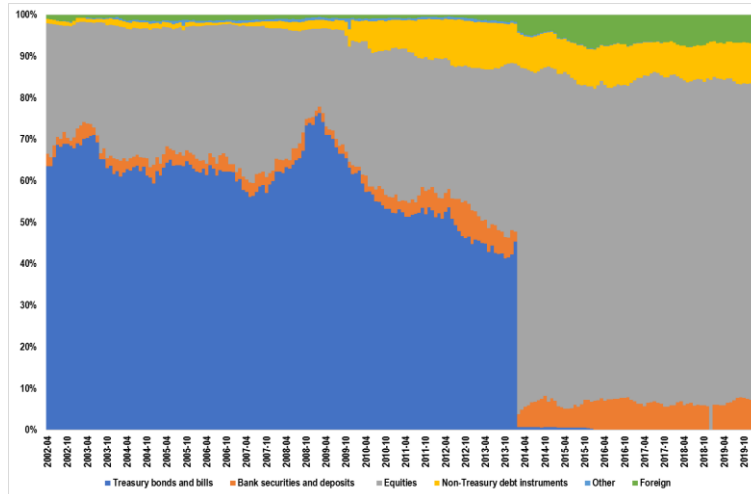

Fig. 5. Structure of investment portfolio of open pension funds

Source: Own elaboration based on data provided by Financial Supervision Authority

Fig. 6. Cumulated logarithmic rate of return of average open pension fund, benchmark and Social Security Institution

Source: Own elaboration

The decisions regulating the open pension funds market have a clear reflection in structure of portfolio held by these entities. Till February 2014 the main type of financial instruments the funds invested in were Treasury bonds and bills (63%-78%) (Bolisęga, 2013; Czerwińska, 2011; Trippner, 2012). Approximately 1/3 of assets consisted of equities. This mix of various types of assets remained relatively stable till 2014 due to only slight changes in investment limits (e.g. open pension funds were allowed to invest up to 50% of their assets in equities before 2011, 52.5% in 2011, 55% in 2012, 57.5% in 2013 and 60% in 2014). A dramatic shift in the structure of assets held by open pension funds occured in 2014 after enacting a ban of investing in Treasury securities and transferring them to Social Security Institution. At the same time the minimum limit of equities held equal to 75% was introduced (it would decrease year by year: in 2015 to 55%, in 2016 to 35%, in 2017 to 15% and then

abolished). As a result equities became the main component of portfolios of open pension funds (approx. 85%) and despite reduction of their net assets more than by half, they remained one of the most important investors on Warsaw Stock Exchange. Moreover, this situation is quite unsual from worldwide perspective as pension funds are exposed to huge level of investment risk (Jakubowski, 2015). This solution is widely criticised by specialists as disallowing the pension funds to create freely more secure strategies (Kompa & Wiśniewski, 2014, 2015b; Kompa & Witkowska, 2015b; Lisowski, 2015).
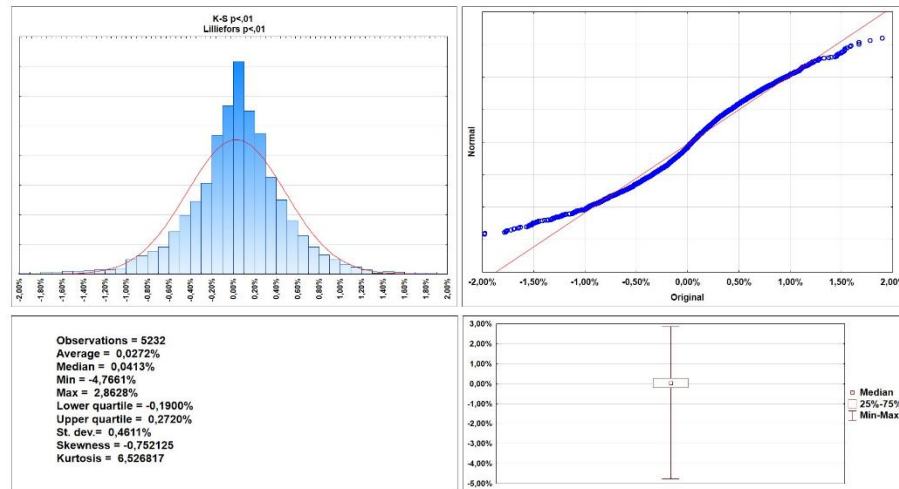
Fig. 7. Histogram, QQ-plot and box chart of daily rates of return of average open pension fund

Source: Own elaboration
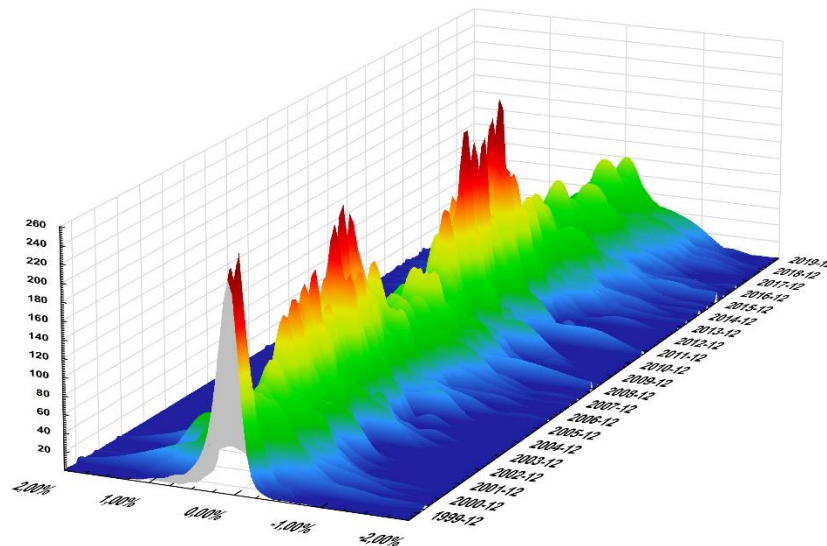
Fig. 8. Smoothed monthly distributions of daily rates of return of open pension funds

Source: Own elaboration

The imposed investment limits are perceived as a main cause of similarity between performance of open pension funds (Frasyniuk-Pietrzyk, 2008; Kompa & Witkowska, 2015a). Fig.6 shows cumulated logarithmic rates of return achieved by average fund, constructed benchmark and Social Security Institution. Before 2014 there was

no benchmark against which performance of funds could have been compared. The so called minimum rate of return was a function of average return of all funds, so it could not have been used as an independent benchmark (Jonas, 2010). As a result as benchmark was chosen a portfolio built from main Warsaw Stock Exchange index – WIG and 3M WIBOR (treated as equivalent to short-term risk-free rate) in proportions given by average portfolio of all funds. In 2014 a legal benchmark was introduced defined as portfolio built from WIG (80%) and 3M WIBOR increased by 50 bp (20%). It can be noticed that for most of the analyzed time the performance of open pension funds did not differ from benchmark while it outperformed significantly the Social Security Institution.

Statistical summary (fig.7) shows that as usually in case of financial time series the fat-tails can be observed (normality hypothesis rejected) as well as negative skewness. Fig.8 illustrates the smoothed monthly distributions of daily rates of return of open pension funds. The increase in risk exposure after 2014 is perfectly visible from the shape of the distributions drawn.

3. Literature Review

The modern analysis of performance of collective investment institutions has begun when the famous investigation by Michael Jensen was published (Jensen, 1968). Since then numerous analyses of this issue have been prepared. Unfortunately, in Poland the history of contemporary collective investment institutions is significantly shorter as these institutions could have been allowed to operate only after abolishing the centrally planned economy in early 1990s. The research devoted solely to the results achieved by pension funds began to be published after the reform of the pension system in 1999. The problem of efficiency of the newly created open pension funds became widely discussed.

The first studies analysing performance of Polish open pension funds concentrated solely on rates of return achieved by these entities (Borowski, 2004; Czechowska, 2002; Trippner, 2008). Generally it was emphasized, that the results were satisfactory from future pensioner's point of view. Unfortunately, these studies covered a very short period of time. Moreover, the authors did not take into account the problem of investment risk what makes their conclusions dubious.

The financial crisis of 2007-2009 attracted the attention of the researchers to the problem of including risk into their investigations regarding the efficiency of Polish open pension funds. Most of the studies taking into account riskiness of funds investments exploit the widely known measures connected with Capital Asset Pricing Model of Treynor, Sharpe, Lintner and Mossin and single-index model created by William Sharpe and their modifications.

(Zimny, 2011) emphasizes that risk (previously a "hidden" parameter) must be taken into account while assessing the performance of open pension funds. The presented analyses using Markowitz efficient frontier idea and Sharpe ratio confirms that open pension funds are mean-variance efficient. Moreover they are not better nor worse than benchmark index constructed from WIG index (40%) and 3M WIBOR (60%).

Witkowska et al. (Kompa & Witkowska, 2014, 2015a, 2016b, 2016a; Witkowska, 2018; Witkowska & Kompa, 2015, 2017; Witkowska et al., 2019) in a series of studies investigated the efficiency of open pension funds using a wide variety of measures (i.e. mainly risk to reward ratios). The general conclusion is that open pension funds perform better than Social Security Institution, most benchmarks and stable-growth mutual funds (i.e. mutual funds characterised by the most similar investment policies).

Table 1. Results of studies analysing efficiency of Polish open pension funds (OPF)

Study	Period	Methods	Conclusions
(Czechowska, 2002)	1999-2001	Comparisons of rates of return	OPF achieve the aim of increasing wealth of future pensioners
(Borowski, 2004)	1999-2003	Comparisons of rates of return	OPF are highly efficient
(Trippner, 2008)	1999-2007	Comparisons of rates of return	OPF achieve the aim of increasing wealth of future pensioners
(Frasyniuk-Pietrzyk, 2008)	1999-2007	Jensen alpha	OPF are not worse nor better than benchmark
(Zimny, 2011)	1999-2011	Efficient frontier analysis, Sharpe ratio	OPF are mean-variance efficient
(Rusielik, 2011)	2009	Data Envelopment Analysis, Stochastic Frontier Analysis	Most OPF are effective
(Kompa & Witkowska, 2014)	1999-2013	Comparisons of rates of return, Sharpe ratio, Treynor ratio	OPF beat benchmark independently on market conditions
(Frasyniuk-Pietrzyk & Pietrzyk, 2014)	2000-2013	Jensen alpha, Treynor-Mazuy model, Henriksson-Merton model, Weigel model, Connor-Korajczyk model	OPF are not worse nor better than benchmark OPF selectivity abilities are poor
(Żebrowska-Suchodolska & Karpio, 2014)	1999-2013	CALMAR ratio, Omega, upside potential, Sortino ratio, Sharpe-Israelsen ratio	OPF achieve results similar to performance of stable-growth mutual funds
(Dziwok, 2015)	2001-2012	Information ratio & coefficient, imperfect foresight analysis	Most OPF beat the benchmark
(Lisowski, 2015)	1999-2014	Comparisons of rates of return, Sharpe ratio, Ward's method	OPF beat benchmark, despite not fully profiting from diversification
(Witkowska & Kompa, 2015)	2000-2013	Sharpe ratio, generalized Sharpe ratio, Sortino ratio, Treynor ratio, Sharpe alpha	OPF beat Social Security Institution
(Kompa & Witkowska, 2015a)	2000-2013	Sharpe ratio, generalized Sharpe ratio, Sortino ratio, Treynor ratio, Black-Treynor ratio	OPF are not worse than Social Security Institution
(Kompa & Witkowska, 2016a)	1999-2013	Comparisons of rates of return, Sharpe ratio, Treynor ratio	OPF beat benchmarks independently on market conditions
(Kompa & Witkowska, 2016b)	2009-2015	Sharpe ration, Treynor ratio, Jensen alpha	OPF beat stable-growth investment funds and capital market
(Witkowska & Kompa, 2017)	2000-2013	Comparisons of rates of return, Sharpe ratio, generalized Sharpe ratio, Sharpe-Israelsen ratio, Sortino ratio, Treynor ratio, Sharpe alpha	OPF beat Social Security Institution
(Karpio & Żebrowska-Suchodolska, 2017)	2014-2017	Treynor-Mazuy model, Henriksson-Merton model	OPF selectivity abilities are poor
(Witkowska, 2018)	2000-2013	Comparisons of rates of return, Sharpe ratio, generalized Sharpe ratio, Sharpe-Israelsen ratio, Sortino ratio, Treynor ratio, Sharpe alpha	OPF beat benchmarks, including money market portfolios and bond portfolios
(Wyszyński, 2018)	1999-2018	Comparisons of rates of return	OPF beat similar investment funds while highly dependent on market conditions
(Witkowska et al., 2019)	2009-2015	Comparisons of rates of return, Sharpe ratio, Treynor ratio, Jensen alpha	OPF beat stable-growth mutual funds; their efficiency decreases after 2014 reform

Source: Own elaboration

992

These conclusions were confirmed by results of the research carried out by (Dziwok, 2015; Lisowski, 2015; Rusielik, 2011; Wyszyński, 2018) using methods as different as hierarchical clustering (Ward's method), imperfect foresight analysis or Data Envelopment Analysis and Stochastic Frontier Analysis. On the other hand there exist studies showing that abilities of managers of open pension funds are quite similar to skills of managers of mutual funds (Frasyniuk-Pietrzyk, 2008; Żebrowska-Suchodolska & Karpio, 2014). It is also noticed that their ability to select outperforming companies and instruments is rather poor, so they rather simply follow the market (Frasyniuk-Pietrzyk & Pietrzyk, 2014; Karpio & Żebrowska-Suchodolska, 2017).

Besides analysis of performance of open pension funds against an external benchmark also the issue of similarities between results of particular funds were investigated. Taking this problem into consideration from theoretical point of view, the existence of the so called minimum rate of return calculated as an internal benchmark based on the collective performance of the open pension funds induced "herd" behaviour of funds. As a consequence most studies show that independently of the performance measure adopted (Jensen alpha, Sharpe ratio, Sortino ratio, etc.) and method of analysis (hierarchical clustering, ANOVA, etc.) the results of open pension funds are hardly distinguishable (Frasyniuk-Pietrzyk, 2008; Kompa & Witkowska, 2015a; Lisowski, 2015; Marcinkiewicz, 2015; Mikołajczak & Bajak, 2017). There are also studies claiming lack of homogeneity of the analysed entities, but it can be observed that these conclusions are based on multicriteria techniques taking into account also net assets, number of members of funds, etc. (Franków, 2015; Obidziński, 2008). Due to significant differences between characteristics other than rates of return employing multicriteria techniques inevitably leads to misleading conclusions of heterogeneity while from the future pensioner's viewpoint the only important variable is achieved rate of return.

The abovementioned studies concentrate on analysis which might be called static as it does not take into account possible (and quite probable) changes in variables describing particular entities in time. The importance of stability of results achieved by particular open pension funds for future pensioners is obvious. The main result are summarized in tab.2.

Table 2. Results of studies analysing changes in characteristics of Polish open pension funds (OPF)

Study	Period	Methods	Conclusions
(Miszczyńska, 2003)	2001-2002	PROMETHEE, AHP	Performance of OPF is stable over time
(Miszczyńska, 2004)	2004-2005 (forecasts)	PROMETHEE, AHP	Performance of OPF is stable over time
(Mikulec, 2008)	2002-2007	Taxonomic measures, Walesiak measure, Kendall's tau	Performance of OPF is stable over time
(Białek & Mikulec, 2009)	1999-2007	Comparisons of rates of return, R/S analysis, Hurst exponent	Performance of most OPF does not exhibit long-memory effect
(Włodarczyk, 2010)	2005-2009	Taxonomic measures, Spearman's rho, Kendall's tau	Performance of OPF is unstable over time
(Kucharski, 2011)	2009-2010	PROMETHEE	Performance of OPF is rather stable over time with spectacular exceptions
(Buła, 2014)	2007-2011	Taxonomic measures, Spearman's rho	Performance of OPF is stable over time
(Bukietyńska, 2017)	2002-2010	Sharpe ratio, analysis of inversions	Performance of OPF is unpredictable and random over time

Source: Own elaboration

Most studies provide arguments in favour of the hypothesis that results of open pensions funds are characterized by time stability (Buła, 2014; Kucharski, 2011; Mikulec, 2008; Miszczyńska, 2003, 2004). What must be remembered while formulating conclusions based on this empirical evidence is the method used by the authors.

They do not concentrate solely on rates of return, but exploit multicriterial analysis investigating also e.g. net assets, number of the members, level of fees etc. The common practice in this case is to consider multiple criteria while calculating appropriate taxonomic measures and most of the abovementioned variables are stable over time. The persistence of the resulting measure is a simple consequence of the normative assumption that performance of open pension funds is measured by taking into account a variety of different variables. But from the point of view of a single pensioner the only significant characteristic is rate of return. Quite contrarily to the previous results, in this case almost the pure randomness can be observed over time (Białek & Mikulec, 2009; Bukietyńska, 2017; Włodarczyk, 2010). An additional confirmation of these results are conclusions drawn by (Chybalski, 2011; Jędrzychowska, 2011). According to their analyses of connections between funds performance and members transfers there does not exist any dependence between rates of return of particular fund and inflow of members to it. Assuming rationality of *homo oeconomicus* this result is not surprising.

Unfortunately, the number of studies analysing repeatability of rates of return solely is rather small and they regard only the first years of functioning capital pillar of Polish pension system. There exists an evident scientific gap, which is covered in the following paragraphs of this study.

4. Data and Methodology

Apart from the selection of the research method, it is also extremely important to choose the right measure of pension fund performance. The use of measures that take into account only the profitability of investments leads to their distortion, because it omits the level of risk borne. Therefore, this study adopted the Sharpe ratio (Sharpe, 1966) and Modigliani risk-adjusted performance (Modigliani & Modigliani, 1997) as they are free of this deficiency. The analyses used daily valuations of accounting units of open pension funds made available by the money.pl. The Sharpe ratio and Modigliani–Modigliani measure were calculated for 82 quarter periods starting from the third quarter of 1999 using the formulas (Bacon, 2013):

$$S_{i,t} = \frac{\overline{r}_{i,t} - \overline{r}_{f,t}}{s_{i,t}} \, , \tag{1}$$

and:

$$M_{i,t}^2 = \frac{\overline{r}_{i,t} - \overline{r}_{f,t}}{s_{i,t}} s_{m,t} + \overline{r}_{f,t} \, , \tag{2}$$

where $S_{i,t}$ – the revised Sharpe ratio of the *i-th* pension fund in period t, $\overline{r}_{i,t}$ – the average daily logarithmic return from the accounting unit of the *i-th* fund in period t, $s_{i,t}$ – the standard deviation of the daily logarithmic excess return from the accounting unit of the *i-th* fund in period t, $\overline{r}_{f,t}$ – the average daily logarithmic return from the risk-free asset in period t, $s_{m,t}$ – the standard deviation of the daily logarithmic excess return from the market in period t, i – the pension fund number ($i = 1, 2, 3, ..., 17$), t – the period number (a quarter; $t = 1, 2, 3, ..., 82$; $t = 1$ corresponds to the third quarter of 1999). The quarters in which the fund started or ended operations were not considered. The WIBID TN rate was adopted as the estimated risk-free interest rate, while the WIG index was chosen as a market proxy (data provided by stooq.com). The obtained Sharpe ratio and M^2 values were then used to examine the performance repeatability of open pension funds using the methods described in the following part of the paragraph.

Provided that $\{X_t : t \in \mathrm{N}\}$, where N – the set of natural numbers, is a stochastic process with a finite state space (for convenience, let us assume that the values, which the process can take, belong to the set $\{x_1, x_2, ..., x_n\}$). We can say that X_t is a Markov chain, if the probability of the process adopting a certain value at time t depends only

on the value that the process assumed at time $t–1$, and not on the values previously adopted. If the probability does not additionally depend on time, then we call such the process a homogeneous Markov process. Then the probability of being at the moment t in the state j provided that it was previously in the state i ($i, j \in \{1,2,3,...,n\}$) is constant, it is marked as $p_{i,j}$. Considering $p_{i,j}$ for all permissible pairs (i, j), one can build a square matrix with n rows showing all transition probabilities for period:

$$Q(1) = \begin{bmatrix} p_{1,1} & p_{1,2} & \cdots & p_{1,n} \\ p_{2,1} & p_{2,2} & \cdots & p_{2,n} \\ \cdots & \cdots & \cdots & \cdots \\ p_{n,1} & p_{n,2} & \cdots & p_{n,n} \end{bmatrix}. \tag{3}$$

The element at the intersection of the i-th row and the i-th column is equal to $p_{i,j}$. If we now denote by $\bar{m}_t = \left[p_1^t, p_2^t, ..., p_n^t \right]$ the vector the probabilities with which the process X_t can take the appropriate values ($\Pi\left(\{\omega \in \Omega : X_t(\omega) = x_k\}\right) = p_k^t$), then $\bar{m}_{t+1} = \bar{m}_t \cdot Q(1)$. Similarly, transition probabilities are considered over s periods and a transition matrix appropriate for s periods is defined as $\bar{m}_{t+s} = \bar{m}_t \cdot Q(s)$ (obviously $Q(s) = [Q(1)]^s$). Moreover, additional information about the process can be obtained by examining the vector $\bar{m}_\infty$ illustrating the probability of being in particular states after an infinite number of transitions ($\bar{m}_\infty = \lim_{t\to\infty} \bar{m}_t$) regardless of the initial state $\bar{m}_0$ (it has been proven that $\bar{m}_\infty$ always exists) (Epstein, Howlett, & Schulze, 2003).

Assuming that the stochastic process reflecting the value of the Sharpe ratio and M^2 in subsequent quarters in relation to the performance of open pension funds is a homogeneous Markov process with a transition matrix identical for all funds, it is possible to estimate individual transition probabilities. To simplify, the number of states can be assumed $n = 2$, while being in state 1 is equivalent to achieving a result below the median, and state 2 in other cases. We then estimate $p_{1,1}$ as the ratio of the number of funds that failed in two consecutive periods to the number of funds that failed in the first period; $p_{1,2}$ as the ratio of the number of funds that failed in the first period and met with success in the second period to the number of funds that failed in the first period, etc. Actually, the transition probabilities should be estimated for each two successive periods separately. However, a small number of operating open pension funds would suggest making calculations in relation to observations accumulated in all periods, which in practice means assuming that the process is close to reaching a stationary status. In the absence of repeatability or reversal, the calculated quotients should be close to $1/2$. The significance of deviations from this value can be tested using χ^2 test. The test statistic is:

$$\chi^2 = \frac{(N_{1,1} - N/4)^2 + (N_{1,2} - N/4)^2 + (N_{2,1} - N/4)^2 + (N_{2,2} - N/4)^2}{N/4}, \tag{4}$$

where N – the total number of observations, $N_{1,1}$ – the number of funds that in two consecutive periods achieved a result below the median, etc. In the absence of a correlation between performance results, this statistic has an asymptotic distribution χ^2 with one degree of freedom. If this hypothesis is rejected then it should be considered that the performance of pension funds is characterised by repeatability or reversal (conclusions regarding the direction of dependence are formulated by analysing the system of transition probabilities) (Jackowicz & Filip, 2009).

The method using the transition matrix, however simple, has a significant disadvantage – it forces discretization of the state space of the process. The decision on the number of states and the method of assigning the observation to a specific state is made arbitrarily, which can significantly affect the performance achieved. Therefore, this study also uses a method based on estimation of the stochastic kernel.

In the previous part of the paragraph, the stochastic process was analysed which had a finite state space. This reasoning can be extended to cases when the state space is an infinite set (e.g. a set of real numbers). Then the use of the concept of transition matrix is impossible. In this situation, the concept of stochastic kernel was introduced. The stochastic kernel is the function of two variables (point and set), which for a given point is a probability distribution relative to a given set and meets certain weak regularity conditions (Feller, 1971). They can be treated as a form of a transition matrix with an infinite number of rows and columns. For the stochastic process $\{X_t : t \in \mathrm{N}\}$ with the set of states, which are the subset of real numbers, the stochastic kernel can be determined by the density function $f(x_{t+1}|x_t)$ of a conditional distribution of a random variable $(X_{t+1}|X_t)$ (Jackowicz & Filip, 2009). If we assume that X_t is a homogeneous Markov process, then the density function $f(x_{t+1}|x_t)$ will be independent of t. Its estimation is based on the use of equation $f(x_{t+1}|x_t) = \dfrac{g(x_t,x_{t+1})}{h(x_t)}$, where $g(x_t,x_{t+1})$ is the density of the two-dimensional random variable (X_t, X_{t+1}), whereas $h(x_t)$ is the random variable density X_t. The estimation of the conditional density function will take the form $\hat{f}(x_{t+1}|x_t) = \dfrac{\hat{g}(x_t,x_{t+1})}{\hat{h}(x_t)}$, where $\hat{g}(x_t,x_{t+1})$ is an estimator of the random variable density function (X_t, X_{t+1}), and $\hat{h}(x_t)$ is an estimator of the random variable density function X_t. The first step is therefore to estimate the function $g(x_t,x_{t+1})$ and $h(x_t)$. Kernel estimators are used to this end. With N observations of a random variable (X_t, X_{t+1}) (i.e. pairs of $(x_{i,t},x_{i,t+1})$, $i = 1, 2, 3, ..., N$) we can specify the estimator of function $g(x_t,x_{t+1})$ as:

$$\hat{g}(x_t,x_{t+1}) = \frac{1}{Nab}\sum_{i=1}^{i=N} K_2\left(\frac{x_t - x_{i,t}}{a}, \frac{x_{t+1} - x_{i,t+1}}{b}\right), \tag{5}$$

and of function $h(x_t)$:

$$\hat{h}(x_t) = \frac{1}{Na}\sum_{i=1}^{i=N} K_1\left(\frac{x_t - x_{i,t}}{a}\right), \tag{6}$$

where $K_2(x,y)$ and $K_1(x)$ are functions that satisfy the conditions $\int_{-\infty}^{+\infty}\int_{-\infty}^{+\infty} K_2(x,y)\,dxdy = 1$ and $\int_{-\infty}^{+\infty} K_1(x)\,dx = 1$, whereas a and b – parameters (so-called bandwidths). In this study, it was assumed that $K_1(x)$ is a density function of de Moivre-Gauss standard distribution and $K_2(x,y)$ (in accordance with the recommendations in the paper by Hyndman et al.) meets the condition $K_2(x,y) = K_1(x)K_1(y)$ (Hyndman, Bashtannyk, & Grunwald, 1996). Parameters a and b were estimated using the formulas (Silverman, 1986):

$$a = \left(\frac{4}{3N}\right)^{\frac{1}{5}} s_{x_t}, \tag{7}$$

$$b = \left(\frac{4}{3N}\right)^{\frac{1}{5}} s_{x_{t+1}}, \tag{8}$$

where s_{x_t} and $s_{x_{t+1}}$ are the standard deviations from the sample calculated for the random variable X_t and X_{t+1}, respectively (Gajek & Kałuszka, 1994). Due to the small number of open pension funds operating on the Polish market, the estimations were made for the observations collected in all periods. As in the case of the transition

probabilities, the estimation of the conditional density function $f\left(x_{t+1}\middle|x_t\right)$ should be carried out for each two successive periods separately. The use of observations from all periods prompted by the amount of data is, in practical terms, synonymous with the assumption that process X_t is strictly stationary. Then the density functions $g(x_t, x_{t+1})$ and $h(x_t)$ do not change over time. The approach adopted in this study was used, inter alia, in the previously mentioned work of Jackowicz and Filip (Jackowicz & Filip, 2009).

Performing the estimation results in obtaining a two-dimensional conditional density function whose full graphical presentation is only possible in three-dimensional space. It is, however, much easier to analyse the orthogonal projection of the examined surface. To do this, one should plot isohypses connecting the points with the same value of the conditional density function. Interpretation of the shape of the stochastic kernel then takes place on a similar principle as examining the terrain with the help of a hypsometric map. In this study, it was assumed that the abscissa reflects the process values from moment t, and on the ordinate from the moment $t+1$. A sample plot is presented below.

The key to assessing the performance repeatability is the location of the stochastic kernel relative to the straight line with the equation $x_{t+1} = x_t$ (inclined at an angle of 45°, marked with a white dashed line in the figure). The position of the kernel along it proves the lack of mobility – funds that have achieved good (bad) performance in the current period will also most likely record good (bad) performance.
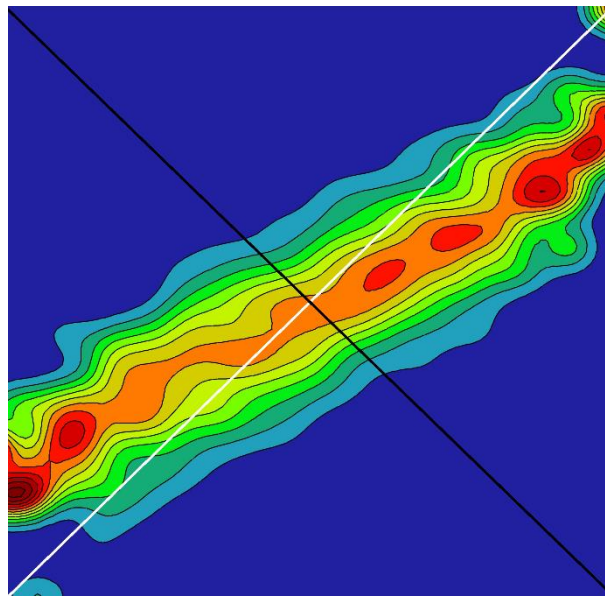

Fig. 9. Sample orthogonal projection of stochastic kernel

Source: Own elaboration

Counterclockwise rotation indicates that the differences between funds are widening over time. Clockwise rotation towards straight line $x_{t+1} = 0$ proves the disappearance of differences and the decrease in the impact of the performance of the current period on the performance of future periods. The phenomenon of reversal could be said when the kernel is arranged approximately along a straight line inclined at an angle of 135° (black dashed line in the figure).

5. Results and Discussion

Using the data made available by the money.pl and stooq.com in accordance with the guidelines contained in previous paragraph, Sharpe ratios and Modigliani risk-adjusted performance for individual open pension funds were calculated. The charts show their average value and typical area of variation for each quarter.

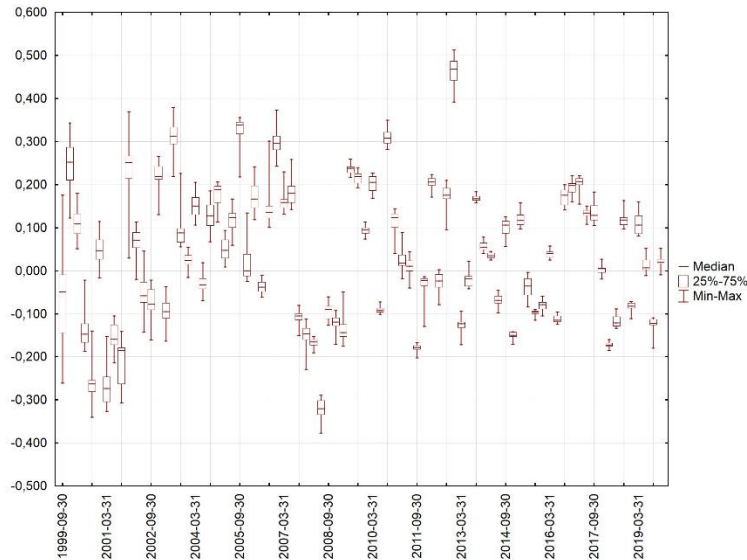**Fig. 10.** Average value and typical area of Sharpe ratio volatility for open pension funds in the period of Q3 1999 – Q4 2019

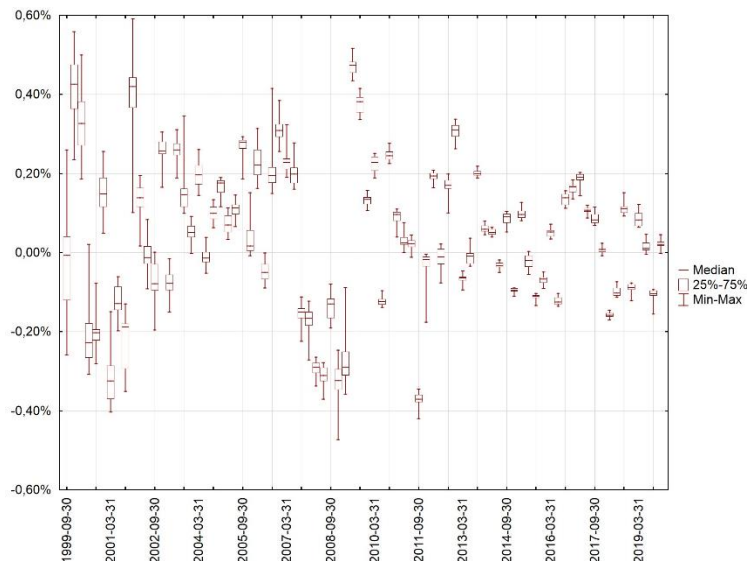*Source:* Own elaboration (data provided by stooq.com and money.pl)

Fig. 11. Average value and typical area of Modigliani risk-adjusted performance volatility
for open pension funds in the period of Q3 1999 – Q4 2019

Source: Own elaboration (data provided by stooq.com and money.pl)

The plots presented show a clear trend of the performance of pension funds to be similar over the period considered. In the next step, a two-line transition matrix was estimated, with the discretization using the sample median equal to Me = 0.032 (Sharpe ratio):

$$Q(1) = \begin{bmatrix} 0.527 & 0.473 \\ 0.466 & 0.534 \end{bmatrix}$$

or Me = 0.05% (Modigliani-Modigliani measure):

$$Q(1) = \begin{bmatrix} 0.530 & 0.470 \\ 0.465 & 0.535 \end{bmatrix}.$$

Then, by making 2^{100} iterations, an approximation of the invariant vector was obtained in case of Sharpe ratio:

$$\bar{m}_\infty \approx \begin{bmatrix} 0.496 & 0.504 \end{bmatrix}$$

and Modigliani-Modigliani measure:

$$\bar{m}_\infty \approx \begin{bmatrix} 0.497 & 0.503 \end{bmatrix}.$$

In addition, the χ^2 test statistics were calculated. The p-value for Sharpe ratio is 0.036 while for the M^2 0.026. The obtained results indicate the statistically significant, though rather weak repeatability (resulting from the analysis of estimated transition probabilities). In the long run, the initial choice of the fund does not seem to affect the amount of the pension – only systematic monitoring of performance achieved and a change of fund (if it achieved an unsatisfactory rate of return) could increase the amount of the future benefit.

To obtain confirmation of the above results, an analysis using a stochastic kernel was also carried out. Based on the estimated unconditional densities, the conditional density function $f\left(x_{t+1}\middle|x_t\right)$ was calculated and is shown on the graphs. To simplify the analysis, charts of an orthogonal projection of a stochastic kernel on a plane were also plotted. The projected shapes of the kernel allow us to confirm the previously formulated conclusions.
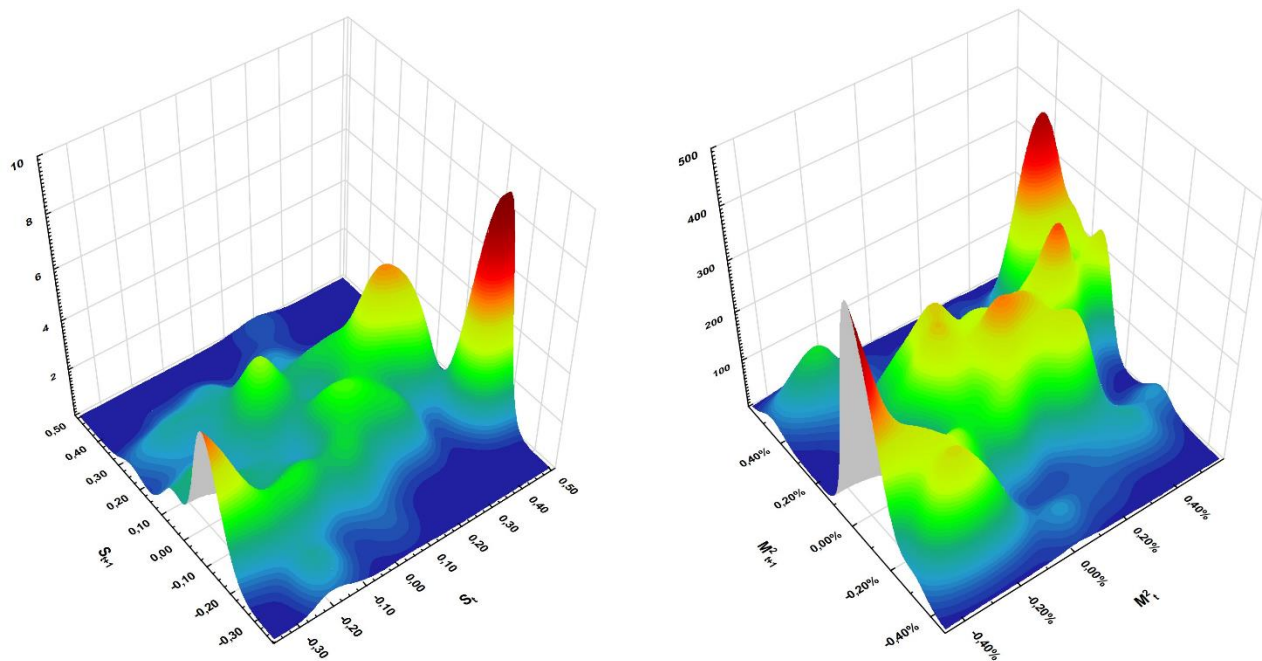

Fig. 12. Estimated conditional density function for Sharpe ratio (left graph) and M^2 (right graph)

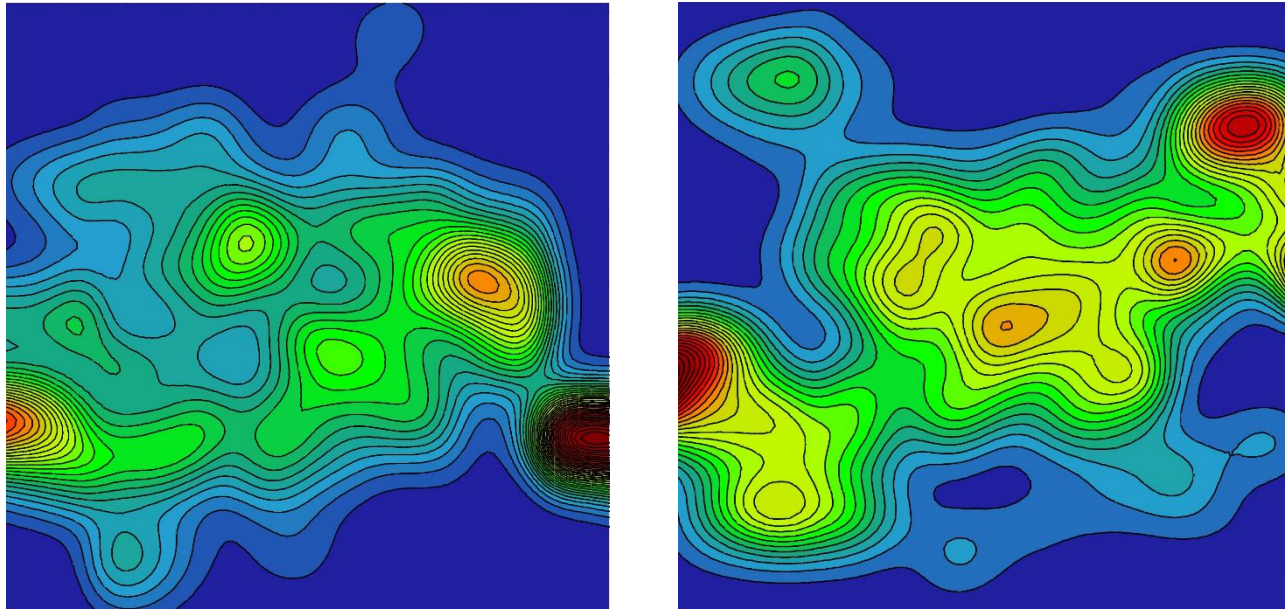*Source:* Own elaboration (data provided by stooq.com and money.pl)

Fig. 13. Orthogonal projection of the estimated stochastic kernel for Sharpe ratio (left graph) and M^2 (right graph)

Source: Own elaboration (data provided by stooq.com and money.pl)

They indicate some performance repeatability, in particular for the central values. On the other hand, the trend of performance convergence of open pension funds is much more marked for the extreme values, especially in case of Sharpe ratio.

The results presented for quarterly data remain valid while analysing Sharpe ratio and Modigliani-Modigliani measure for yearly periods. The transition matrices are almost the same and only minor differences might be observed in case of shape of stochastic kernel.

The results obtained using theory of Markov chains and estimated stochastic kernel are consistent with the conclusions formulated by (Bukietyńska, 2017) using test of inversion of Sharpe ratio for open pension funds. Moreover, the author's observations cover 20-year period while (Bukietyńska, 2017) only 9-year period. The presented results remain in agreement with assumption of future pensioner's rationality and empirical evidence provided by (Jędrzychowska, 2011). Thus, we may conclude, that the initial choice and potential changes of open pension fund in the future are not important for future pensioner's wealth. As a consequence, we may treat the set of open pension funds as unity or at least a very homogenous one.

Conclusions

The calculations made allowed us to draw the conclusion about the phenomenon of very weak, though statistically significant, performance repeatability achieved by open pension funds operating on the Polish market. The analysis of empirical data also confirms previous local and international results (Bohl, Lischewski, & Voronkova, 2011; Draženović, Hodžić, & Maradin, 2019; Kurach, 2019) indicating that the rates of return recorded by individual entities become increasingly similar over time. The study highlighted the clear advantages of the methods adopted to study distribution dynamics – above all, the ease of interpretation of the results obtained. These methods are a valuable tool in the process of analysing various economic phenomena.

References

Bacon, C. R. (2013). *Practical Risk-adjusted Performance Measurement*. Chichester: Wiley.

Białek, J., & Mikulec, A. (2009). Analiza wartości jednostek uczestnictwa i stóp zwrotu OFE (The analysis of participation unit and return rate values in Open Pension Funds). *Wiadomości Statystyczne. The Polish Statistician*, (5), 36–57. Retrieved from https://stat.gov.pl/cps/rde/xbcr/pts/PTS_ws_05_2009.pdf

Błaszczyk, B. (2020). *The story of the Open Pension Funds and the Employee Capital Plans in Poland. Will it succeed this time?* CASE-Center for Social and Economic Research. Retrieved from CASE-Center for Social and Economic Research website: https://case-research.eu/files/?id_plik=6396

Bohl, M. T., Lischewski, J., & Voronkova, S. (2011). Pension Funds' Performance in Strongly Regulated Industries in Central Europe: Evidence from Poland and Hungary. *Emerging Markets Finance & Trade*, *47*, 80–94. JSTOR. Retrieved from www.jstor.org/stable/23047102

Bolisęga, M. (2013). Analiza struktury portfela inwestycyjnego otwartych funduszy emerytalnych (An Analysis of the Portfolio Structure of Open Pension Funds). *Zeszyty Naukowe Uniwersytetu Ekonomicznego w Krakowie*, *907*(7), 19–32. Retrieved from https://zeszyty-naukowe.uek.krakow.pl/article/download/796/672

Borowski, K. (2004). Analiza polityki inwestycyjnej i wyników otwartych funduszy emerytalnych (Analysis of the investment policy and results of open pension funds). In *A. Borodo (ed.): Zagadnienia prawne i ekonomiczne systemu emerytalnego* (pp. 141–153). Toruń: Wydawnictwo Dom Organizatora. Retrieved from https://www.researchgate.net/publication/275462168_Analiza_polityki_inwestycyjnej_i_wynikow_OFE

Brzeszczyński, J., Bohl, M. T., & Serwa, D. (2019). Pension funds, large capital inflows and stock returns in a thin market. *Journal of Pension Economics and Finance*, *18*(3), 347–387. https://doi.org/10.1017/S147474721800001X

Bugaj, R. (2018). Co dalej z ubezpieczeniami społecznymi? (What about Social Security?). *Studia Ekonomiczne*, (3–4), 173–187. Retrieved from http://inepan.pl/wp-content/uploads/2019/12/SE_2018-3-4_Bugaj.pdf

Bukietyńska, A. (2017). The test of inversion in the analysis of investment funds. *Central and Eastern European Journal of Management and Economics*, *5*(3), 277–289. Retrieved from http://ceejme.eu/wp-content/uploads/2018/02/ceejme_3_7_art_01.pdf

Buła, R. (2014). Analiza pozycji otwartych funduszy emerytalnych w latach 2007-2011 (Analysis of the position of open pension funds in 2007-2011). *Dokonania Młodych Naukowców*, (3), 544–548. Retrieved from https://mpra.ub.uni-muenchen.de/59706/

Chybalski, F. (2005). Miary charakteryzujące zmiany na rynku OFE (Measures describing changes on the market of Open Pension Funds). *Wiadomości Statystyczne. The Polish Statistician*, 41–51. Retrieved from https://www.infona.pl/resource/bwmeta1.element.ekon-element-000000126277

Chybalski, F. (2008). Efektywność działalności powszechnych towarzystw emerytalnym w zakresie zarządzania OFE (The efficiency of the pension companies activity involving pension fund management). In *T. Dudycz (ed.): Wartość jako kryterium efektywności* (pp. 185–192). Wrocław: Indygo Zahir Media.

Chybalski, F. (2011). *The choice of open pension fund made by citizens of Poland in the years 2003-2009: The analysis of the criteria* (No. Discussion Paper PI-1102). London: Pensions Institute. Retrieved from Pensions Institute website: http://www.pensions-institute.org/wp-content/uploads/2019/workingpapers/wp1102.pdf

Chybalski, F. (2012). Uwarunkowania konkurencji na rynku funduszy emerytalnych na przykładzie OFE (Determinants of competition on the market of pension funds on the example of Open Pension Funds). *Policy*, *22*(1), 15–39. Retrieved from http://cde.com.pl/files/xmarticles/items/0/Studia%20Ekonomiczne.pdf

Chybalski, F. (2014). Zmiany w polskim systemie emerytalnym A.D. 2014: Diagnoza i perspektywy (Changes in Polish Pension System in 2014: Diagnosis and Prospects). *Optimum: Studia Ekonomiczne*, (4 (70)), 135–149. Retrieved from https://repozytorium.uwb.edu.pl/jspui/bitstream/11320/2923/1/11_Chybalski.pdf

Czechowska, I. (2002). Działalność lokacyjna OFE-źródło finansowania ubezpieczeń emerytalnych (Investment Activity of Open Pension Funds—Sources of Financing of Pensions Insurances). *Acta Universitatis Lodziensis. Folia Oeconomica*, *160*, 41–54. Retrieved from http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.hdl_11089_18903/c/41_Acta_Universitatis_Lodziensis._Folia_Oeconomica._160._2002.pdf

Czerwińska, T. T. (2011). Aktywność inwestycyjna otwartych funduszy emerytalnych na giełdowym rynku akcji. Projekcja rozwoju (Investment Activity of the Open Pension Funds on the Stock Market Projection of the Development). *Zeszyty Naukowe*

Uniwersytetu Szczecińskiego. Finanse, Rynki Finansowe, Ubezpieczenia, (33), 65–78. Retrieved from http://www.wneiz.pl/nauka_wneiz/frfu/33-2011/FRFU-33-65.pdf

Draženović, B. O., Hodžić, S., & Maradin, D. (2019). The Efficiency of Mandatory Pension Funds: Case of Croatia. *South East European Journal of Economics and Business*, *14*(2), 82–94. https://doi.org/10.2478/jeb-2019-0015

Duignan, B. (2007). Problem of induction. Retrieved August 22, 2020, from Encyclopedia Britannica website: https://www.britannica.com/topic/problem-of-induction

Dziwok, E. (2015). Alternatywne metody oceny jakości zarządzania portfelem instrumentów dłużnych na przykładzie inwestycji OFE w latach 2001-2012 (Alternative Assessment Methods of Bond Portfolio Management—Case of Open Pension Funds in Poland between 2001-2012). *Studia Ekonomiczne*, *221*, 22–31. Retrieved from http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.desklight-34713b65-2d39-49d3-9904-e59bf8c26f97/c/02_28.pdf

Epstein, P., Howlett, P., & Schulze, M.-S. (2003). Distribution dynamics: Stratification, polarization, and convergence among OECD economies, 1870–1992. *Explorations in Economic History*, *40*(1), 78–97. https://doi.org/10.1016/S0014-4983(02)00023-2

Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance*, *25*(2), 383–417. https://doi.org/10.2307/2325486

Feller, W. (1971). *An introduction to probability theory and its applications*. New York: Wiley.

Franków, M. (2015). Analiza porównawcza funkcjonowania otwartych funduszy emerytalnych z wykorzystaniem wybranych metod statystycznych (Comparative Analysis of the Open Pension Funds Efficiency Using Selected Statistical Methods). *Zeszyty Naukowe Wyższej Szkoły Bankowej We Wrocławiu*, *15*(2), 207–222. Retrieved from https://ojs.wsb.wroclaw.pl/index.php/WSBRJ/article/view/111/88

Frasyniuk-Pietrzyk, M. (2008). Możliwość wykorzystania miernika Jensena do oceny działalności inwestycyjnej funduszy emerytalnych w Polsce (Using Jensen's Measure to Assess the Investments Activity of Open Pension Funds in Poland). *Studia i Prace Wydziału Nauk Ekonomicznych i Zarządzania Uniwersytetu Szczecińskiego*, (9), 515–523. Retrieved from http://bazhum.muzhp.pl/media//files/Studia_i_Prace_Wydzialu_Nauk_Ekonomicznych_i_Zarzadzania/Studia_i_Prace_Wydzialu_Nauk_Ekonomicznych_i_Zarzadzania-r2008-t9/Studia_i_Prace_Wydzialu_Nauk_Ekonomicznych_i_Zarzadzania-r2008-t9-s515-523/Studia_i_Prace_Wydzialu_Nauk_Ekonomicznych_i_Zarzadzania-r2008-t9-s515-523.pdf

Frasyniuk-Pietrzyk, M., & Pietrzyk, R. (2014). Efektywność inwestycji funduszy emerytalnych w Polsce-wybrane problemy (Pension funds performance in Poland – selected problems). *Prace Naukowe Uniwersytetu Ekonomicznego We Wrocławiu*, (371), 88–100.

Gajek, L., & Kałuszka, M. (1994). *Wnioskowanie statystyczne: Modele i metody (Statistical Inference: Models and Methods)*. Warszawa: Wydawnictwa Naukowo-Techniczne.

Góra, M. (2018). *Thinking about pension systems for the 21st century: A few remarks based on the Polish example*. CASE – Centrum Analiz Społeczno-Ekonomicznych – Fundacja Naukowa. Retrieved from https://case-research.eu/files/?id_plik=5618

Góra, M., & Rutkowski, M. (1998). *The Quest for Pension Reform: Poland's Security through Diversity* (No. 20111; p. 34). The World Bank. Retrieved from The World Bank website: http://documents.worldbank.org/curated/en/876001468776049038/pdf/multi-page.pdf

Gubernat, E. (2013). Funkcjonowanie i rozwój rynku otwartych funduszy emerytalnych w Polsce w okresie 2000-2010 (Operation and Development of the Open Pension Funds in Poland in the Years 2000-2010). *Nauki o Finansach*, (1 (14)), 28–42. Retrieved from http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.desklight-c93b8dd1-af9c-4db4-a6cd-248e1a39e7e6/c/28.pdf

Hyndman, R. J., Bashtannyk, D. M., & Grunwald, G. K. (1996). Estimating and Visualizing Conditional Densities. *Journal of Computational and Graphical Statistics*, *5*(4), 315–336. https://doi.org/10.2307/1390887

Jackowicz, K., & Filip, D. (2009). *Powtarzalność wyników funduszy inwestycyjnych w Polsce (Repeatability of investment funds results in Poland)*. Narodowy Bank Polski. Retrieved from https://www.nbp.pl/publikacje/materialy_i_studia/ms236.pdf

Jakubowski, S. (2015). Open Pension Funds market after reform of 2014–the global perspective. *The Central European Review of Economics and Management*, *15*(4), 527–538. https://doi.org/10.29015/cerem.118

Jakubowski, S. (2016). Proces wygaszania kapitałowej części ubezpieczenia emerytalnego (Phasing-out of the Funded Part of Pension System in Poland). *The Central European Review of Economics and Management*, *16*(1), 73–84. https://doi.org/10.29015/cerem.171

Jędrzychowska, A. (2011). Stopa zwrotu funduszy emerytalnych jako czynnik wpływający na decyzje o wyborze OFE (The rate of return of pension funds as a factor influencing decisions on the selection of Open Pension Funds). *Zeszyty Naukowe Wyższej Szkoły*

Bankowej We Wrocławiu, (20), 189–199. Retrieved from http://bibliotekacyfrowa.wsb.wroclaw.pl:8080/dlibra/editions-content?id=415

Jensen, M. (1968). The performance of mutual funds in the period 1945-1964. *The Journal of Finance*, *23*(2), 389–416. Retrieved from https://www.jstor.org/stable/2325404

Jonas, K. (2010). Ocena efektywności funkcjonowania otwartych funduszy emerytalnych w Polsce w ujęciu teoretycznym i praktycznym (Assessment of the Functioning of Open Pension Funds in Poland from a Theoretical and Practical Perspective). *Zeszyty Naukowe Uniwersytetu Ekonomicznego w Krakowie*, (816), 23–33. Retrieved from https://r.uek.krakow.pl/jspui/handle/123456789/819

Karpio, A., & Żebrowska-Suchodolska, D. (2017). Analiza porównawcza aktywnych i pasywnych strategii inwestycyjnych otwartych funduszy emerytalnych i otwartych funduszy zrównoważonych w latach 2014-2017 (Comparison Analysis of the Active and Passive Investment Strategies of Open Pension Funds and Open Balanced Mutual Funds in the Years 2014-2017). *Zarządzanie i Finanse*, (3), 63–73. Retrieved from https://wzr.ug.edu.pl/.zif/5_5.pdf

Kołodziejczyk, K. (2019). Przyczyny likwidacji systemu otwartych funduszy emerytalnych (Reasons for Withdrawing the System of Polish Open Pension Funds). *Rozprawy Ubezpieczeniowe. Konsument Na Rynku Usług Finansowych*, *3*(33), 81–94. Retrieved from https://rf.gov.pl/ru/wp-content/uploads/2019/12/JOIN33_6.pdf

Kominek, Z. (2012). Regulatory induced herding? Evidence from Polish pension funds. *Economic Change and Restructuring*, *45*(1–2), 97–119. https://doi.org/10.1007/s10644-011-9111-2

Kompa, K., & Wiśniewski, T. (2014). "Security through diversity": Portfolio diversification of private pension funds. *Metody Ilościowe w Badaniach Ekonomicznych*, *15*(1), 50–57. Retrieved from http://qme.sggw.pl/pdf/MIBE_T15_z1.pdf

Kompa, K., & Wiśniewski, T. (2015a). Diversification of portfolios of pension funds – vagary or necessity? *Bulletins of the Szczecin University. Finance. Financial Market. Insurance*, *2015*(75), 245–255. https://doi.org/10.18276/frfu.2015.75-20

Kompa, K., & Wiśniewski, T. (2015b). Dywersyfikacja portfeli otwartych funduszy emerytalnych-kaprys czy konieczność (Diversification of Portfolios of Pension Funds—Vagary or Necessity?). *Finanse, Rynki Finansowe, Ubezpieczenia. Szczecin*, (75), 245–255. Retrieved from https://www.researchgate.net/publication/272827968_Dywersyfikacja_portfeli_otwartych_funduszy_emerytalnych_-_kaprys_czy_koniecznosc_Diversification_of_portfolios_of_pension_funds_-_vagary_or_necessity

Kompa, K., & Witkowska, D. (2014). Pension Funds in Poland: Efficiency Analysis for Years 1999–2013. *Dynamic Econometric Models*, *14*, 105–124. http://dx.doi.org/10.12775/DEM.2014.006

Kompa, K., & Witkowska, D. (2015a). Czy otwarte fundusze emerytalne były nieefektywne? (Were open pension funds inefficient?). *Journal of Management and Finance*, (4), 85–99. Retrieved from http://zif.wzr.pl/pim/2015_4_2_5.pdf

Kompa, K., & Witkowska, D. (2015b). Pension system in Poland: Performance of pension funds. *Estudios de Economía Aplicada*, *33*(3), 965–984. Retrieved from https://www.researchgate.net/publication/312192290_Pension_System_in_Poland_Performance_of_Pension_Funds

Kompa, K., & Witkowska, D. (2016a). Efficiency of private pension funds in Poland. *Aestimatio: The IEB International Journal of Finance*, (12), 48–65. Retrieved from https://pdfs.semanticscholar.org/39ba/7857c9cc1e769619e873202cc4d3f76fadc4.pdf

Kompa, K., & Witkowska, D. (2016b). Performance of pension funds and stable growth open investment funds during the changes in the Polish retirement System. *Dynamic Econometric Models*, *16*(1), 117–131. Retrieved from https://apcz.umk.pl/czasopisma/index.php/DEM/article/viewFile/11743/10728

Kucharski, A. (2011). Rangowanie za pomocą programowania wielokryteriowego jako sposób oceny konkurencyjności OFE (Multicriteria Ranking as the Way of the Evaluation of the Open Pension Funds Competitiveness). *Annales Universitatis Mariae Curie-Skłodowska. Sectio H. Oeconomia*, *45*(2), 323–332. Retrieved from http://annales.umcs.lublin.pl/tt_p.php?rok=2011&tom=45&sectio=H&numer_artykulu=31&zeszyt=2

Kurach, R. (2019). Do they beat the market in the new regulatory environment – the case of Polish pension funds. *Economic Research-Ekonomska Istraživanja*, *32*(1), 370–383. https://doi.org/10.1080/1331677X.2018.1561319

Lisowski, R. (2015). Stopy zwrotu otwartych funduszy emerytalnych po reformie (Open Pension Funds' Rates of Return After the Reform). *Prace Naukowe Uniwersytetu Ekonomicznego We Wrocławiu*, (403), 141–152. Retrieved from https://dbc.wroc.pl/Content/30593/PDF/Lisowski_Stopy_Zwrotu_Otwartych_Funduszy_Emerytalnych_2015.pdf

Marcinkiewicz, E. (2015). Zachowania stadne i konkurencja na rynku OFE: badanie empiryczne z wykorzystaniem wielowymiarowej analizy statystycznej (Herding Behaviour and Competition on the Open Pension Funds Market: An Empirical Study with the Application of Multivariate Statistical Analysis). *Marketing i Rynek*, (5 (CD)), 1067–1080. Retrieved from

https://www.researchgate.net/publication/296654756_Zachowania_stadne_i_konkurencja_na_rynku_OFE_Badanie_empiryczne_z_wykorzystaniem_wielowymiarowej_analizy_statystycznej

Mikołajczak, P., & Bajak, P. (2017). Czy warto rezygnować z OFE? Stopa zwrotu i ryzyko kapitałowej części systemu emerytalnego w Polsce w latach 1999-2013 (Is it worth abandoning Open Pension Funds? The rate of return and risk of the capital of the pension system in Poland in the years 1999-2013). *Zeszyty Naukowe Polskiego Towarzystwa Ekonomicznego w Zielonej Górze*, (6), 103–111. https://doi.org/10.26366/PTE.ZG.2017.84

Mikulec, A. (2008). Metody analizy rynku OFE w ujęciu dynamicznym (Methods of Open Pension Funds Market Analysis from a Dynamic Perspective). *Studia i Prace Wydziału Nauk Ekonomicznych i Zarządzania Uniwersytetu Szczecińskiego*, (10), 588–604. Retrieved from https://www.researchgate.net/publication/309716286_Metody_analizy_rynku_OFE_w_ujeciu_dynamicznym_Methods_of_OFE_market_analysis_from_a_dynamic_perspective

Miszczyńska, D. (2003). Wielokryteriowy ranking Otwartych Funduszy Emerytalnych metodami AHP i PROMETHEE (Multicriterial Ranking of Open Pension Funds with AHP and PROMETHEE Methods). *Acta Universitatis Lodziensis. Folia Oeconomica*, *166*, 119–133. Retrieved from http://dspace.uni.lodz.pl:8080/xmlui/bitstream/handle/11089/6829/116-130.pdf?sequence=1&isAllowed=y

Miszczyńska, D. (2004). Ranking Otwartych Funduszy Emerytalnych-prognozy 2004-2005 (Ranking of Open Pension Funds—Forecasts for 2004-2005). *Acta Universitatis Lodziensis. Folia Oeconomica*, *177*, 5–21. Retrieved from http://dspace.uni.lodz.pl/xmlui/bitstream/handle/11089/7160/5-21.pdf?sequence=1&isAllowed=y

Modigliani, F., & Modigliani, L. (1997). Risk-Adjusted Performance. *The Journal of Portfolio Management*, *23*(2), 45–54. https://doi.org/10.3905/jpm.23.2.45

Obidziński, P. (2008). Statystyczna ocena funkcjonowania rynku OFE na podstawie danych komisji nadzoru finansowego (Statistical Analysis of the Open Pension Funds Market). *Studia i Prace Wydziału Nauk Ekonomicznych i Zarządzania Uniwersytetu Szczecińskiego*, (10), 616–625. Retrieved from http://bazhum.muzhp.pl/media//files/Studia_i_Prace_Wydzialu_Nauk_Ekonomicznych_i_Zarzadzania/Studia_i_Prace_Wydzialu_Nauk_Ekonomicznych_i_Zarzadzania-r2008-t10/Studia_i_Prace_Wydzialu_Nauk_Ekonomicznych_i_Zarzadzania-r2008-t10-s616-625/Studia_i_Prace_Wydzialu_Nauk_Ekonomicznych_i_Zarzadzania-r2008-t10-s616-625.pdf

Parvi, R. (2014). Efektywność finansowa Otwartych Funduszy Emerytalnych (Effectiveness of Open Pension Funds in Poland). *Zeszyty Naukowe Wyższej Szkoły Bankowej We Wrocławiu*, (5 (43) Wyzwania biznesowe XXI wieku), 251–263. Retrieved from bibliotekacyfrowa.wsb.wroclaw.pl:8080/dlibra/editions-content?id=574

Rhoades, S. (1993). The Herfindahl-Hirschman index. *Federal Reserve Bulletin*, (March), 188–189. Retrieved from https://EconPapers.repec.org/RePEc:fip:fedgrb:y:1993:i:mar:p:188-189:n:v.79no.3

Rusielik, R. (2011). Efektywność zarządzania portfelem inwestycyjnym OFE przez powszechne towarzystwa emerytalne-przykład zastosowania analizy granicznej (The effectiveness of pension funds management by the universal pension fund societies—Example of the frontier analysis). *Metody Ilościowe w Badaniach Ekonomicznych*, *12*(2), 301–311. Retrieved from http://yadda.icm.edu.pl/yadda/element/bwmeta1.element.desklight-f7651347-18aa-4847-a615-15bedbe121ed/c/MIBE_T12_z2_29.pdf

Samborski, A. (2014). Pension Fund Governance: The Polish Experience. *Corporate Ownership and Control*, *11*(3), 349–357. https://doi.org/10.22495/cocv11i3conf1p4

Sharpe, W. F. (1966). Mutual Fund Performance. *The Journal of Business*, *39*(1), 119–138. Retrieved from http://www.jstor.org/stable/2351741

Silverman, B. W. (1986). *Density estimation for statistics and data analysis*. London: Chapman & Hall.

Styczeń, M., & Gomułka, S. (1999). *Estimating the Impact of the 1999 Pension Reform in Poland, 2000-2050* (SSRN Scholarly Paper No. ID 1436389). Rochester, NY: Social Science Research Network. https://doi.org/10.2139/ssrn.1436389

Trippner, P. (2008). Ocena zarządzania kapitałami w II filarze emerytalnym w Polsce (Assessment of capital management in the second pension pillar in Poland). *Organizacja i Kierowanie*, (2), 127–139. Retrieved from https://ssl-kolegia.sgh.waw.pl/pl/KZiF/czasopisma/oik/numery/Documents/2008_NR_2(132).pdf

Trippner, P. (2012). Ewolucja struktury portfeli inwestycyjnych podmiotów zarządzających kapitałem emerytalnym w obowiązkowym filarze komercyjnym (The Evolution of the Structure of Investment Portfolios of Capital Managing Institutions in the Obligatory Commercial Pension Pillar). *Annales Universitatis Mariae Curie-Skłodowska. Sectio H. Oeconomia*, *46*(4), 837–849. Retrieved from http://dlibra.umcs.lublin.pl/dlibra/docmetadata?id=5554&from=publication

Witkowska, D. (2018). Zastosowanie różnych miar efektywności do oceny zarządzających oszczędnościami przyszłych emerytów (Application of Different Efficiency Measures to Evaluate the Managers who Control Future Pensioners' Savings). *Przedsiębiorczość i Zarządzanie*, *19*(3.2), 335–351. Retrieved from http://piz.san.edu.pl/docs/e-XIX-3-2.pdf

Witkowska, D., & Kompa, K. (2015). Ocena efektywności funduszy emerytalnych z wykorzystaniem metod porządkowania liniowego (Evaluation of The Pension Funds Efficiency Using Linear Ordering Methods). *Metody Ilościowe w Badaniach Ekonomicznych*, *16*(4), 191–200. Retrieved from http://qme.sggw.pl/pdf/MIBE_T16_z4.pdf

Witkowska, D., & Kompa, K. (2017). Polish Pension Market Performance in Comparison to Selected Benchmarks. *Economics & Sociology*, *10*(1), 35–47. https://doi.org/10.14254/2071-789X.2017/10-1/3

Witkowska, D., Kompa, K., & Mentel, G. (2019). The Effect of Government Decisions on the Efficiency of the Investment Funds Market in Poland. *Journal of Business Economics and Management*, *20*(3), 573–594. https://doi.org/10.3846/jbem.2019.9861

Włodarczyk, A. (2010). Analiza stabilności wyników inwestycyjnych OFE z wykorzystaniem miernika syntetycznego (Stability Evaluations of Open Pension Funds Investments Results with Using the Synthetic Measure). *Prace i Materiały Wydziału Zarządzania Uniwersytetu Gdańskiego*, (4/2), 133–144. Retrieved from http://yadda.icm.edu.pl/yadda/element/bwmeta1.element.ekon-element-000170655049

Wyszyński, W. (2018). Znaczenie otwartych funduszy emerytalnych dla polskiego rynku finansowego (The Significance of Open Pension Funds for the Polish Financial Market). *Roczniki Ekonomii i Zarządzania*, *46*(4), 109–122. Retrieved from http://ojs.tnkul.pl/index.php/reiz/article/download/10320/10249

Żebrowska-Suchodolska, D., & Karpio, A. (2014). Efektywność inwestycyjna funduszy emerytalnych na tle FIO stabilnego wzrostu (Investment effectiveness of the open pension funds in comparison with the stable growth mutual funds). *Metody Ilościowe w Badaniach Ekonomicznych*, *15*(4), 26–36. Retrieved from https://journals.umcs.pl/h/article/download/5151/4406

Zimny, A. (2011). Efektywność inwestycyjna OFE w świetle teorii portfela (Investment efficiency of Open Pension Funds in the light of portfolio theory). *Acta Universitatis Lodziensis. Folia Oeconomica*, *259*, 173–194. Retrieved from http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.hdl_11089_769/c/173-194.pdf

Żuk, P., & Żuk, P. (2018). Retirees without pensions and welfare: The social effects of pension privatization in Poland. *Critical Social Policy*, *38*(2), 407–417. https://doi.org/10.1177/0261018317731982

Acknowledgements

Rafał BUŁA Ph.D. is assistant professor at Department of Investment, College of Finance, University of Economics in Katowice, Poland. His dissertation devoted to fractal analysis of financial markets has been awarded by the Chair of Polish Financial Supervision Authority as the best thesis defended in 2016 in field of finance. Research interests: investments, financial markets, risk assessment, fractal analysis.
ORCID ID: orcid.org/0000-0002-9890-7078

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

DISCOVERING THE ROLE OF INTELLECTUAL CAPITAL IN LATIN AMERICA: INSIGHTS FROM ECUADOR

Mariuxi Pardo-Cueva [1], Guillermo Antonio Dávila [2], Laura Magali Chamba-Rueda [3]

[1,3] Department of Business Sciences, Universidad Técnica Particular de Loja, Loja, Ecuador
[2] Knowledge Engineering Department, Federal University of Santa Catarina, Florianopolis, Brazil

E-mails:[1] mcpardo@utpl.edu.ec; [2]davila.guillermo@gmail.com; [3]lmchamba@utpl.edu.ec

Abstract. This research aims to characterize the intellectual capital in Ecuadorian companies and to validate the applicability of a scale suitable for this context, considering each of its dimensions (human capital, structural capital, and relational capital), as well as innovation aspects of the Ecuadorian companies. The study uses a mixed approach, including factorial analysis and descriptive statistics, using a sample of 88 companies from different economic sectors, located in a single province of Ecuador. The results verified the applicability of the scale and its usefulness for future studies; and they showed that there are different kinds of configurations of intellectual capital, based on the sector and type of innovation usually implemented by companies. In order to be more innovative, construction firms in Ecuador need to focus more on the structural and relational dimensions of intellectual capital, and accommodation and food services industries should orient their efforts toward further developing their human capital. Future studies may explore the opportunities for enhancing innovation performance based on the management of intellectual capital in more detail, using larger sample sizes.

Keywords: intellectual capital; human capital; relational capital; structural capital; Latin America

1. Introduction

Today, knowledge-based organizations are an important part of modern societies (Berezinets, et al. 2016), as companies compete by relying more on their intangible resources as key value factors (Sharabati, Jawad & Bontis, 2010). These intangible resources, which produce important benefits to overcome the weaknesses of small and medium enterprises (Verbano & Crema, 2016; Jordão & Novas, 2017) can be technologies, employee skills, process innovations, organizational structure, creativity, industrial networks, or relationships with customers and external suppliers (Starovic & Marr, 2004; Keong Choong, 2008).

Given the characteristics of the market, being technological developments, changes in social conditions, and reduction of the products' life cycles, what will make companies more competitive in the current economic scenario will be the effective management of knowledge assets, including intellectual capital (Zhang & Lv, 2015; Agostini, et al. 2017).

Intellectual capital (IC) is recognized as one of the most important assets for business results and the basis for market leadership and differentiation, because it provides unique resources that cannot be easily imitated by competitors, and ultimately, it helps to deliver competitive advantage and value for organizations (Lev, 2001; Curado, 2008; Roos, 2017).

Considering the importance of intangible assets for companies, researchers have formulated some methodological frameworks and empirical studies in order to measure and evaluate each one of the components of IC and its economic impact (Goebel, 2015). However, much of this research has focused on assessing and analyzing IC in developed countries, or in knowledge-intensive industries such as technology, pharmaceuticals, banking, and telecommunications.

In emerging countries, empirical studies on innovation—and in the particular case of the role of IC for innovation—are still scarce, and often limited to specific regions and sectors (Jardon & Martos, 2012), or regional leaders with a large GDP like Brazil (Davila et al., 2019). In response, the present research aims to characterize IC and innovation and to validate the applicability of an instrument in more traditional and less explored industries, located in an emerging country like Ecuador. These sectors are manufacturing, commerce, information and communication technologies, construction, professional activities, housing, and food services.

The research will try to answer the following questions: How is IC and innovation managed in Ecuadorian companies? How can IC be quantified in emerging countries? How can Ecuadorian companies be characterized in relationship to their IC and the type of innovations they make?

Ecuador was chosen for two reasons. Firstly, Ecuador is one of the most economically stable countries with one of the highest GDP per capita in Latin America. According to the World Bank (2019), Ecuador has the 62nd highest GDP in the world, and it has a human development index of 0.762, above average for Latin American countries. Secondly, Ecuador has specific characteristics and at the same time, it has a lack of academic studies when compared with other emerging countries like Mexico or Brazil. Most Ecuadorian firms are SMEs (Superintendencia de Compañías, Valores y Seguros, 2018). Regarding innovation, Ecuador is ranked 99 worldwide according to the Global Innovation Index (GII, 2019), and this shows a need for the development of innovation capabilities. Private firms make huge investments in formal training for workers and this represents a strength that when combined with quality management and knowledge management, may enhance innovation capabilities. Consequently, Ecuador has good potential for academic analysis that will allow conclusions to be drawn, which will serve as inputs for new studies in the region.

This document is structured as follows: in Section 2, a theoretical review related to IC and innovation is provided. Section 3 describes the methodology, extensively developed in the study. Later, in Section 4, the results found in the research and their respective discussion are presented. Finally, Section 5 shows the conclusions.

2. Literature review

2.1 Innovation in emerging countries

In the current context, characterized by globalization and dynamism resulting from technological disruptions and political and economic turbulence, innovation becomes an intrinsic characteristic for companies wishing to survive in the market (Teece, 2010). Innovation is defined by Schumpeter (1927) as the superior condition achieved due to the improvement or development of a new product or production method, or due to the opening of a new market. The interest of managers and academics in innovation is to try to understand how the innovation phenomenon has been growing in recent decades (Baregheh et al. 2009). Baregheh et al. (2009) state that innovation is being analyzed from different disciplines such as management, economics, technology, and engineering. In management, specifically in studies related to knowledge management, innovation has been conceptualized as a product of factors; one of which is the IC of organizations (Edvinsson, Sullivan, 1996; Sullivan, 1998; Bontis & Fitz-Enz, 2002; Subramaniam & Youndt, 2005).

Despite the growing interest in the subject, the number of studies has evolved very unevenly when developed and emerging countries are compared. In developed countries, there are empirical studies that have characterized IC, have developed measurement techniques for that variable, and have analyzed the relationship between IC and innovation (Bontis, 2001; Cabrita & Bontis, 2008; Marques et al. 2006; Maurer et al. 2011; Cabello-Medina et al. 2011; Dumay & Garanina, 2013; Kianto et al. 2017). Looking at studies on IC and innovation in emerging countries, it is evident that those are scarce and limited in scope to some sectors and regions, and therefore there are greater gaps in knowledge (Jardon & Martos, 2012). This lack of studies about the influence of IC on the innovative performance of companies in emerging countries is critical. This is due to the pressure on companies to innovate in a context where customer's demands are often more complex, and companies frequently face global competitors with better institutional support, access to technology, qualified personnel, and other resources (Dávila et al. 2019).

In the following section, IC and its dimensions will be discussed, as well as the theoretical relationship between IC and innovation. Subsequently, this construction will be characterized in the Ecuadorian context, and based on the results, proposals will be developed that will serve for future empirical studies on the relationship between IC and innovative performance.

2.2 Intellectual capital

The academic literature has provided several definitions related to IC. One of the most influential was established by the authors Stewart & Losee (1994) who considered IC as "the knowledge a company has in order to create a competitive advantage". It also constitutes the knowledge that is generated within the organization and that can be converted into tangible benefits (Edvinsson & Sullivan, 1996; Sullivan, 2000).

For Lev (2001), IC is also an intangible source of value, transmitted by innovations in specific projects or human resource management practices of an organization. Marr, Schiuma, & Neely (2004) further consider that IC is represented by the combination of resources and intangible activities that allows an organization to obtain a competitive advantage through the transformation of material, and financial and human resources into a system capable of creating stakeholder value and organizational innovation.

Jordão & Novas (2017) consider that IC is composed of the relationship between the material and immaterial resources in the possession of an organization. The same interpretation is made by Kujansivu & Lönnqvist (2007),

who mention that IC is made up of all the intangible and non-physical goods that are important in a knowledge-intensive industry.

For Stewart (1997) and Bontis (2001), IC is intellectual material, represented in knowledge, experience, intellectual property, and information that can be used to create wealth; however, Dumay (2016) makes a clarification to this definition considering that it does not take into account the totality of the nature of IC to create wealth, affirming furthermore that the basis of the value creation process (monetary, social, and sustainable) is key to deduct the value and characterization of the IC. Dženopoljac, et al. (2016) further consider that the potential of IC in corporate performance will be evident in terms of the management of this intangible resource.

Current researchers of IC such as Bontis et al. (2015), Dumay & Garanina (2013), and Kianto, et al. (2010) recognize this intangible asset as a term under construction and with multiple facets, since IC constitutes a multidimensional concept of knowledge assets, experience, and practical capabilities to create value of products and services Dumay (2016), using the intelligence rather than just the financial aspect (Allameh, 2018).

At the same time, it is important to highlight that due to the lack of direction related to the classification of intangible assets, there are several arguments related to this issue which have resulted in IC being categorized between two to four dimensions (Dženopoljac et al., 2016). However, to address this weakness, Bontis (1998); Roos, et al. (1997); Sullivan (2000); Roos (2017), Matricano (2016), Wee & Chua (2016); and Buenechea-Elberdin (2017) identified three main components to categorize IC: human capital, structural capital, and relational capital.

Human capital constitutes the combined knowledge, skill, and innovation capacity that employees have in order to accomplish a task (Edvinsson & Malone, 1997). It also contains a series of characteristics such as education, knowledge, cultural value, and corporate identity that can influence creativity and the willingness to create new ideas within the company (McGregor, et al. 2004; Martín-de-Castro, et al. 2011). This gives satisfaction to the employee and the improvement of personal and organizational performance (Martínez-Torres, 2006).

Sayyed (2018) determines that human capital is one of the largest and most important dimensions of IC in an organization. Bontis (1998) also points out that human capital constitutes a source of innovation and a strategic element for an organization. FitzPatrick, et al. (2013) agrees with this argument, and, further considers that human capital is one of the key resources of strategic renewal and therefore cannot be replaced by machines; since human capital is "the intelligence of the member of the organization" (Bontis, 1998, 65).

Structural capital constitutes the knowledge incorporated in the structures and processes of the organization, and it includes databases, patents, trademarks, research and development, technology, information systems, strategies, organizational charts, manuals and programs, and all the capabilities of the organization that support employee productivity (Edvinsson & Malone 1997; Bontis, 2001; Petty & Cuganesan, 2005 and Nazari & Herremans, 2007). Casas Nova, et al. (2017) also pointed out that the procedures, rules, systems, and routines are elements that together define the organizational system (structure and processes). Through structural capital, the company can turn the innovation and energy of its human resources into the property of the organization (Seleim, et al. 2004; Casas Novas et al. 2017). Furthermore, it is considered internal capital since the accumulated knowledge within the company's structures, processes, and capacities remain in the company when the employee goes home (FitzPatrick, et al., 2013).

Relational capital constitutes a network of relations between people and groups of people, through which information and knowledge is transferred in a shared way (Roberts, 2003). Relational capital symbolizes the best

attitude of an organization to incorporate the knowledge that comes from the interaction with the external community, such as suppliers, customers, government, and industry and that it develops throughout its existence (Bontis, 1998; Inkinen, 2015). It is embedded in marketing channels, brand names, reputation, customer satisfaction, franchisees, suppliers, and partners (Bontis, et al. 2000; Davey et al. 2009). Casas Novas et al. (2017) also emphasizes that this capital is not owned by the organization, but it can establish corrective measures with a view to its development and determine connectivity between the elements (internal and external) essential for its formation.

Despite fundamental differences in each of the components of IC, they are not always found separately in organizations. Individual knowledge, for example, is related to human capital, and is often codified and institutionalized through structural capital, which is transferred and used in social networks by social capital. Therefore, the different dimensions of IC influence organizational outcomes, including innovation (Machado et al. 2017).

2.3 Intellectual capital and innovation

Innovation is defined as the openness and willingness to create and test new ideas given by a cultural aspect of the company to seek new ways of doing things, being creative in their methods of operation and product introduction (Schumpeter, 1927; Calantone et al. 2002). Several empirical studies (Fernández, et al. 2000; Subramaniam & Youndt; 2005) concluded that intangible factors have a significant influence on innovation outcomes. For that reason, organizations have realized that they can achieve sustainable innovation through IC and that their success depends largely on their ability to manage this valuable intangible asset (Tootifar, et al. 2014; Buenechea-Elberdin, 2017), since knowledge assets, including IC, are essential to maintaining an appropriate innovation environment and developing sustainable innovative capabilities in a competitive environment (Allameh, 2018). Therefore, IC is seen as an antecedent for innovation (Chahal & Bakshi, 2015).

Some empirical studies have explored the role of IC and its dimensions (relational, structural, and human capital) for enhancing innovation performance. Most studies suggest that relational capital has a positive influence on innovation performance (Capello & Faggian, 2005; Zerenler, et al. 2008; Dorrego, et al. 2013; of Cabrilo & Dahms, 2018). The study by Dorrego et al. (2013) using data from SMEs from different industries shows that relational capital is an antecedent of product innovations. More evidence about the positive influence of relational capital on innovation performance was shown in the study by Zerenler, et al. (2008) in a Turkish automotive parts firm, and in studies using data from medium and large-sized manufacturing and service firms from Serbia (Cabrilo & Dahms, 2018) and Italy (Capello & Faggian, 2005). In addition, Capello & Faggian (2005) evidenced that in firms from high technology sectors, the contributions of relational capital to innovation are higher. In SMEs, the situation is not different: using data from high tech Italian manufacturing firms, the study of Agostini, et al. (2017) shows that firms with more relational capital tend to have better firm outcomes.

Regarding structural capital, its importance for leveraging innovation performance was highlighted by several studies around the world (Cabrilo & Dahms, 2018). Using data from Turkish manufacturing firms, Bayraktaroglu, et. al (2019) demonstrated that structural capital is positively related to innovation performance. Similar results were obtained by Agostini & Nosella (2017) using data from Italian manufacturing SMEs. The study of Buenechea-Elberdin, et al. (2018) classified 180 medium and large-sized firms into two groups: high tech and low tech firms. Their results evidenced that in high tech firms, structural capital influences innovation performance, with capital renewal as a moderating factor. In low tech firms, Buenechea-Elberdin, et al. (2018) show that structural capital has a direct and positive effect on innovation performance.

Human capital is highlighted by academics as a critical dimension of IC. Some studies show a direct relationship between human capital and innovation performance (Bayraktaroglu, et al. 2019), and some others posit that this relationship is moderated for organizational capabilities, for instance absorptive capacity (Engelman et al., 2017). The study by Engelman et al. (2019) uses data from Brazilian manufacturing firms and highlights the positive influence of human capital on absorptive capacity, and of absorptive capacity on innovation performance. Similar results were obtained in the study by Xu & Li (2019), which analyzes high tech and low tech manufacturing SMEs from China, and provides evidence that the impact of human capital in high-tech SMEs is greater than that in non-high-tech SMEs. Despite few studies (Cabrilo & Dahms, 2018) providing evidence of a significant influence of human capital on innovation performance, there seems to be a consensus in academia about the significance of this relationship.

3. Methodology

For this paper's purpose, a mixed approach was used. First, a survey was applied in order to collect information about levels of IC and innovation in firms from Loja, Ecuador. In the second step, the scale used for measuring IC was statistically assessed. In the final step, the study presents a descriptive analysis for explaining relevant aspects related to the dimensions of IC and innovation.

3.1 Sample

The selected sample was of 88 companies from the city of Loja, from the main economic sectors of the Province of Loja—according to the results of the National Economic Census (INEC, 2011)—such as manufacturing, commerce, information and communication, construction, professional activities, lodging, and food services, as described in Table 1. Companies with active status, and registered with the "Superintendencia de Compañias Valores y Seguros of Ecuador" were considered as the basis for the study. The obtained sample represents 21% of the total of 424 companies from these sectors in Loja Province. The information was collected through face-to-face surveys with managers of tactical or strategic levels of the target companies, between March and August 2018.

Table 1. Distribution of companies in this study.

Economic Section	Amount	Percentage
Information and communication	17	13.79%
Manufacturing	27	31.03%
Trade	2	2.30%
Construction	20	22.99%
Professional activities	10	11.49%
Accommodation and services	11	12.64%
Total	**87**	**100%**

Source: Results of the study

The survey contained 40 questions distributed in five blocks. The first block collected general information of the population (to know, among other things, the sector, size, whether the company is family owned or not, and the percentage of women in it); in the second block, data related to human capital was collected; the third block contained questions focused on structural capital; the fourth block was to collect information related with

relational capital; and finally, in the fifth block, data related to innovation was collected. The first and fifth blocks of the survey were developed on the basis of open and closed questions; while, from the second to the fourth block, the design was elaborated with a Likert scale, using a scale of 5 options: (1) strongly disagree, (2) disagree, (3) neither agree nor disagree, (4) agree, and (5) strongly agree.

The scale for IC was developed based on several relevant studies from around the world. The human capital dimension was measured using 11 items based on Ganesan et al. (1996), Babin & Boles (1996), Bontis (2013), Edvinsson & Malone (1997), Sharabati et al. (2010), Hartline & Ferrell (1996), Youndt et al. (2004), and Carmeli, 2004 among others. For measuring the structural capital dimension, 10 items from IRSE (2007), Berry (1991), Ulrich et al. (1999), Song and Parry (1993), Tippins & Sohi (2003), and Youndt et al. (2004) among others were used. Finally, for measuring relational capital, eight items based on Chen et al. (2004), Gallego & Rodríguez (2005), Warn (2005), Youndt et al. (2004), Bontis (1998), Peña (2002), Bueno et al. (2004), and Yli-Renko et al. (2001) among others were used. The authors that support each item of the IC scale are detailed in the appendix.
The instrument was selected as it was considered appropriate for the Ecuadorian context, after conceptual and applicability validations with two academic specialists from the authors' institution, and two external academics. According to Creswell, & Creswell (2017), some questions were added and others were modified to guarantee applicability to the Ecuadorian context. Finally, the new IC instrument was validated by a group of five Ecuadorian entrepreneurs to ensure its functionality before data collection. This instrument is shown in Table 2. Finally, based on Calantone, Cavusgil, & Zhao (2002); and Weerawardena (2003), each company was consulted about its predominant type of innovation: product or process.

3.2 Analysis Method

In line with the objective of the present work, which was to characterize the IC and innovation in the companies of Loja, this work had two parts. First, statistical validations of the reliability and validity of the used scale were made to verify if it was applicable and could correctly represent the variables of IC in the Ecuadorian context. Next, the collected data went through a descriptive analysis, following suggestions from Creswell, & Creswell, (2017). The results were presented and discussed with Ecuadorian and international specialists regarding IC and innovation.

4. Results analysis and discussion

After data collection, the suitability of the instrument to measure the components of IC and innovation in the Ecuadorian context was verified (Chart 2). The reliability of each category was confirmed by verifying values greater than 0.6 for indicator loadings (Hair et. al 2010) and values higher than 0.7 (threshold suggested by Nunnally & Bernstein, 1994) for each construct, following the tests of Dijkstra-Henseler, Jöreskog, and Cronbach's alpha. Convergent validity was confirmed by verifying that the average variance extracted from each construct (AVE) was above 0.5, following the suggestions of Fornell & Larcker (1981). Then, divergent validity was confirmed by verifying that the cross-loadings and the HTMT coefficient (Heterotrait-Monotrait Ratio) were lower than 0.9 for each category, as suggested by Fornell & Larcker (1981). Finally, it was verified that all the indicators or questions had a VIF (variance inflation factor) index lower than 3.3 to guarantee the absence of multicollinearity. After the first assessment of the above-mentioned indicators (first iteration), indicator H1 (VIF > 3.3) was eliminated to avoid multicollinearity; indicators H11, E10, and R5 (loadings less than 0.6) to guarantee reliability; and indicators H8, H9, E3, E4, R3, and R4 (for cross loadings) to guarantee discriminant validity (see details in the Appendix). The second interaction yielded values showing correct reliability and validity, as can be seen in Table 2.

Table 2. Instrument to measure IC in companies in Ecuador.

INDICATORS	Loadings	Dijkstra-Henseler's rho (ρA)	Jöreskog's rho (ρc)	Cronbach's alpha(α)	AVE
HUMAN CAPITAL (HC)		0.898	0.918	0.896	0.617
H1. Employee commitment					
H2. Tasks within deadlines	0.833				
H3. Recognition of efforts and improvements	0.757				
H4. Positive attitude to change	0.792				
H5. Continuing education	0.745				
H6. Degree of initiative for improvement	0.816				
H7. Satisfaction towards subordinates	0.778				
H8. Adaptation to changes					
H9. Competition for the position					
H10. Development of creativity	0.771				
H11. Staff rotation					
STRUCTURAL CAPITAL (SC)		0.896	0.903	0.879	0.539
E1. Periodic review of the strategic plan	0.708				
E2. Coordination of departments	0.807				
E3. Knowledge of activities at all levels					
E4. Incentive to create something new					
E5. Working environment	0.725				
E6. Description of procedures	0.774				
E7. Database	0.774				
E8. Information storage and processing	0.737				
E9. Computer systems	0.614				
E10. Use of patents and/or licenses					
RELATIONAL CAPITAL (RC)		0.866	0.887	0.847	0.569
R1. Customer retainment	0.763				
R2. Relationship with customers	0.815				
R3. Relationship with suppliers					
R4. Assessment of competitors					
R5. Cooperation agreements with the sector					
R6. Relationship with universities, institutes, or innovation centers	0.704				
R7. Knowledge of community needs	0.739				
R8. Socially responsible company	0.853				

Source: Results of the study.

After ensuring that the scale adequately measured IC and its dimensions, the existence of a high correlation between them can be observed, according to the numbers shown in Table 3. This result is similar to previous studies (Bozbura, 2004) and may show that companies develop their IC as a result of generic actions aimed

toward improving their competencies, rather than as a result of a strategy focused on a certain dimension or set of dimensions of IC.

Table 3 - Correlation between the dimensions of IC in companies in Loja

		1	2	3
1	**Human capital**	1		
2	**Structural capital**	0.6271	1	
3	**Relational capital**	0.7209	0.7355	1

Source: Results of the study.

After verifying the scale, IC characteristics and innovation of the studied companies were analyzed using descriptive analysis.
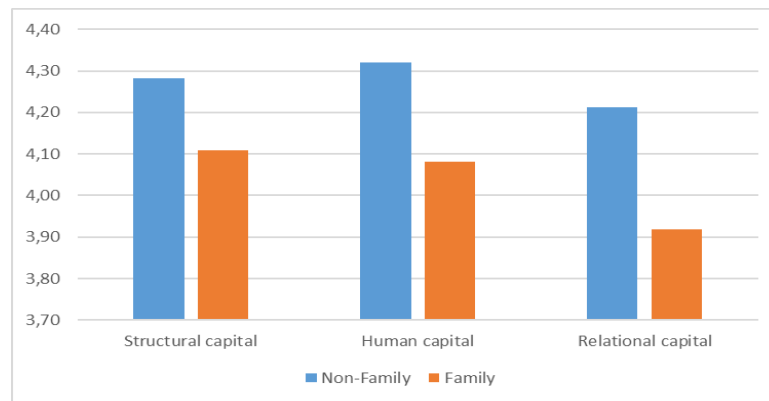

Fig 1. Average IC by type of business
Source: Results of the study

Figure 1 identifies, on average, greater efficiency of the three components of IC (human, structural, and relational) in companies where family ties are not predominant. These results are due to the fact that in family businesses there are greater restrictions or a tendency to increase the dispersion of ownership and even more of their intangible assets. At the same time, a lower average (3.92) was observed in family businesses for relational capital, as most family businesses avoid maintaining entries of external people for fear that they may take control of the organization (Goyzueta, 2013). However, Rodríguez-Suárez, et al. (2013) emphasize the external relations that family businesses must maintain, because of their decision-making processes and, above all, because they are dynamic companies.
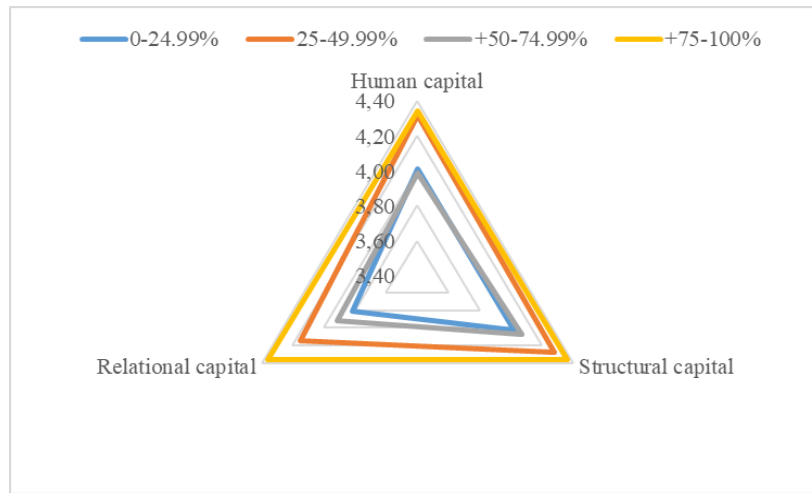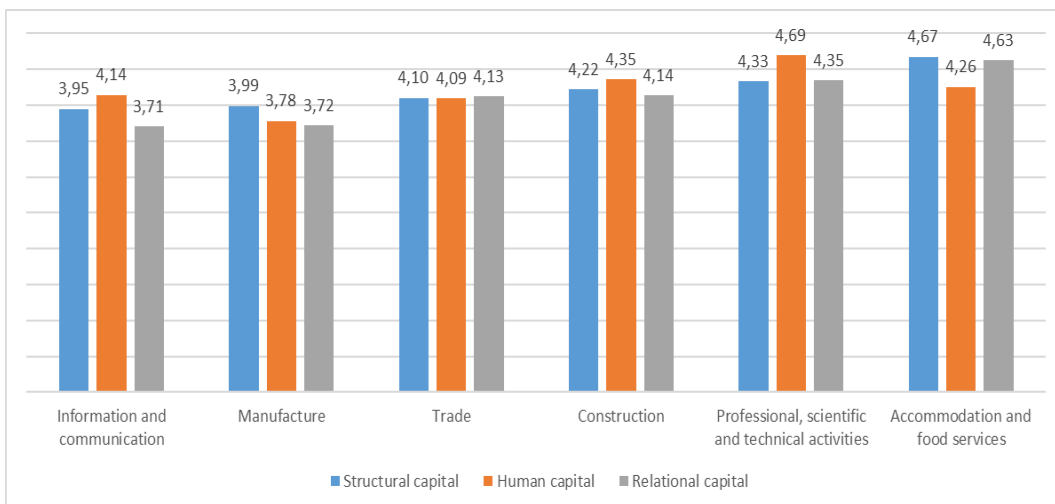
Fig 2. Average of IC components according to % of women in each company.
Source: Results of the study.

In Figure 2, the contribution of the female gender in determining intellectual capital is shown, denoting that when there is greater involvement of women (between 75% and 100% and between 25% and 50%), the structure of IC in each of its components (human, structural, and relational) has a greater contribution to the results of the organization. It is considered that women have the ability to create a favorable environment for companies (Granelli & Robotti, 2016). On the other hand, studies such as that of López (2013) consider that in organizations there should be an equal presence of men and women, constituting a source of creativity and inclusion for entities. Other research supports this statement by ensuring that to assess the IC and management of organizations, the distinction between men and women does not matter because the most relevant factors are the competencies of workers and not their gender (Trequattrini, et al, 2018).

FFig 3. Average IC by economic sector
Source: Results of the study.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Figure 3 shows the distribution of the components of IC by each economic sector of study. It can be seen that in the service sectors, especially knowledge-intensive ones—those related to professional, scientific, and technical activities—there is greater efficiency of human capital. For instance, previous studies in Tunisian ICT firms showed that incremental innovations are positively linked to human capital (Berraies, 2019). Other studies highlighted the importance of human capital and relational capital for innovation in knowledge-intensive firms (Capiello et al., 2020). Regarding accommodation and food services, results from the present study evidenced that these firms needs to focus on the development of human capital (the IC dimension with the lowest mean), in line with previous studies that highlighted the relevance of human capital with information technology (Rudež & Mihalič, 2007) and structural capital (Kim et al., 2012).

In manufacturing companies, there is a greater predominance of structural capital. Surprisingly, the present study showed a predominance of human capital in firms from the construction sector. Even though Lin et al. (2018) posit that business performance in the construction industry relies highly on IC, a recent study by Duodu & Rowlinson (2019) with firms from the construction sector in Hong Kong evidenced that both the structural and relational dimensions have a positive influence on innovation performance, while the effect of human capital on innovation is through the other dimensions. It may be proposed that firms from the construction sector in Loja may be able to increase their innovation performance if they focus on improving their structural and relational capital.

In this regard, it is important to note that Machado, et al. (2017) highlighted the differences in the IC configurations that companies of various types have, and in turn, stated that there is always a synergy between the components of the IC, which act together to achieve competitiveness.
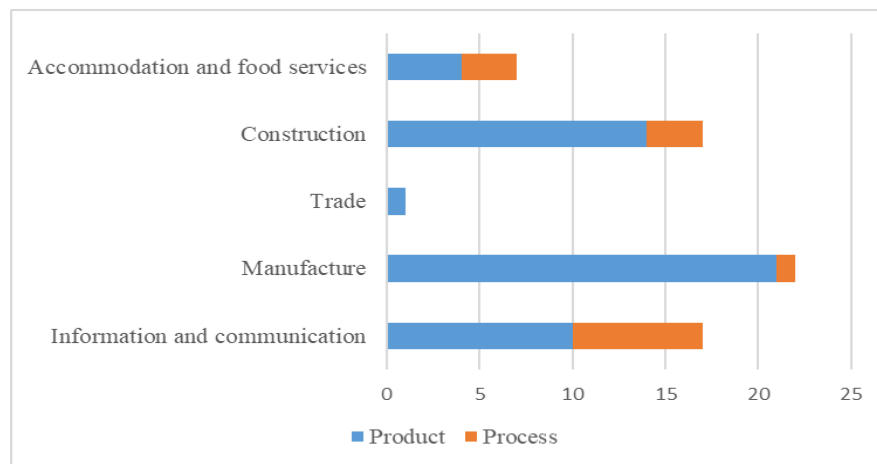

Fig 4. Predominant type of innovation by economic sector
Source: Results of the study.

Due to the characteristics of the sample and the context of the study, there is more product innovation (in goods and services) in the economic sectors analyzed represented in Chart 4. Recent research has shown that companies in Latin America tend to develop incremental product innovations, as they are constantly looking for foreign product designs and adapting them to local environments (Davila, et al. 2018). In line with Hipp & Grupp (2005), in non-knowledge-intensive services (e.g. ICT, construction, housing, and food services) where cost and time

efficiency are important, the present study found that innovation has been carried out on products. Studies by Kianto et, al. (2010), Schilling (2011), and Buenechea-Elberdin (2017) also state that the intensity with which the IC influences innovative performance will also depend on the location of the company, the industry to which it belongs, its level of technology, and its size.
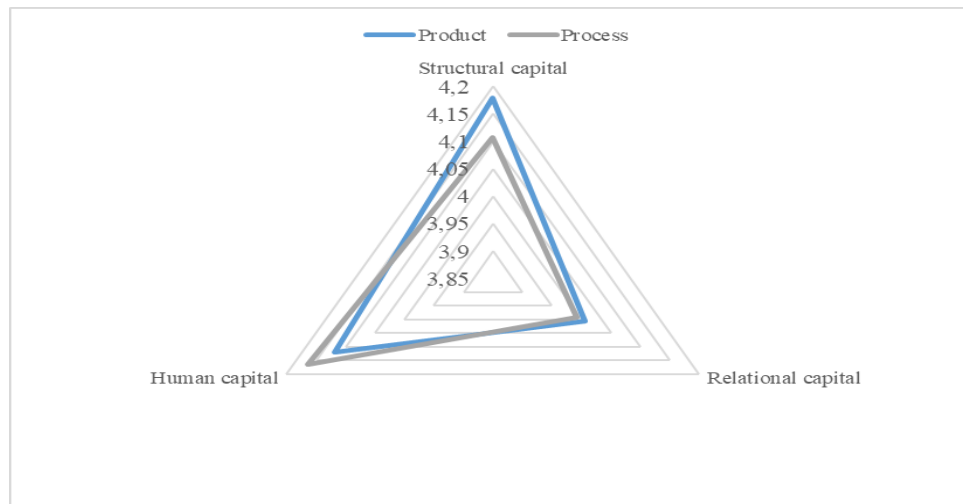

Fig 5. IC dimension averages by type of innovation
Source: Results of the study.

Figure 5 shows that companies which innovate in processes have different IC structures to companies that innovate in goods or services. The first ones have a greater focus on their human capital, because the knowledge, experience, skills, and creativity of the employees are fundamental for the creation of new processes (Mariz Perez et al. 2012). Companies that innovate in products also develop a higher structural capital, as this type of innovation is more complex (mainly in emerging countries), because it requires an adequate integration of specialized knowledge in people, towards final goods and services, supported by organizational processes and technology (Davila, et al. 2018). The support of organizational processes and technology in the launching of products contributes to the reduction of production costs, the faster completion of development projects, to the creation of spaces for innovation, to improving decision-making and results coordination, and to increasing the sales or revenue from new products and services (Huang, et al. 2010; Chen, et al.,2017).

At the same time, the present study showed that all companies, regardless of the type of innovation they present, pay attention to relational capital as external knowledge is a critical input for the innovative performance of organizations (Fosfuri & Tribó, 2008). On this point, Subramaniam & Youndt (2005) state that organizations generate innovations when their individual experts communicate, network, and share knowledge with each other. Dost, et al. (2016) concluded that IC is significantly associated with innovation, whether in products or processes, which is consistent with the results of the present research.

5. Conclusions

The main academic contribution of this study was the adaptation and verification of a scale to analyze IC in emerging countries. This scale can be used in future research, which seeks to identify relationships between IC and organizational outcomes, such as innovation and financial performance, in companies located in Ecuador or other emerging countries.

In addition, the main empirical contribution of this study is the description of the components of IC in Ecuadorian companies. The results show that the configurations of IC may vary in companies according to their sector and the type of innovation usually practiced by each company. This study identified some opportunities related to IC, for improving their innovation performance in firms from Loja. Accommodation and food services may focus on the development of human capital, and construction firms may improve their innovativeness if they increase their efforts to enhance both structural and relational capital. A dynamic view of IC covers the integration of all its components, which means considering the effects and relationships with each other, in order to understand in a broad and organized way the strengths of each organization, and to promote successful innovation.

IC appears to be an important potential engine of innovation for Ecuadorian companies, especially those located in the city of Loja. However, a proposition of this study is that not all companies need a high level of development of all IC dimensions. The level of development required for each dimension depends on its own characteristics, such as economic sector, size, or location. However, it is important to emphasize that all IC dimensions should work together to ensure that the IC contributes to creating value (Casas Novas et al. 2017). Further studies may help to explain which levels of IC and its dimensions are needed in order to achieve superior innovation performance, taking into consideration their sector and size. This will allow the development of guidelines for decision makers improving the efficiency in the allocation of its resources, by prioritizing the dimensions of IC that are most relevant to each organization.

References

Allameh, S. (2018). Antecedents and consequences of intellectual capital. *Journal of Intellectual Capital*, 19(5): 858-874. https://doi.org/10.1108/JIC-05-2017-0068.

Agostini, L., Nosella, A., & Filippini, R. (2017). Does intellectual capital allow improving innovation performance? A quantitative analysis in the SME context. *Journal of Intellectual Capital,* 18(2): 400-418. https://doi.org/10.1108/JIC-05-2016-0056

Babin, B. & Boles, J. (1996). The effects of perceived co-worker involvement and supervisor support on service provider role stress, performance and job satisfaction. *Journal of Retailing*, 2: 57-75. https://doi.org/10.1016/S0022-4359(96)90005-6

Baregheh, A, J Rowley & S Sambrook (2009). Towards a multidisciplinary definition of innovation. *Management Decision,* 47: 1323–1339. https://doi.org/10.1108/00251740910984578

Bayraktaroglu, A. E., Calisir, F., & Baskak, M. (2019). Intellectual capital and firm performance: An extended VAIC model. *Journal of Intellectual Capital.,* 20(3): 406-425. https://doi.org/10.1108/JIC-12-2017-0184

Berezinets, I., Garanina, T. & Ilina, Y. (2016). Intellectual capital of a board of directors and its elements: introduction to the concepts. *Journal of Intellectual Capital*, 17(4): 632-653. https://doi.org/10.1108/JIC-01-2016-0003

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Berraies, S. (2019). The effect of enterprise social networks use on exploitative and exploratory innovations: Mediating effect of sub-dimensions of intellectual capital. *Journal of Intellectual Capital,* 20, 3:426-452. https://doi.org/10.1108/JIC-02-2019-0030

Berry, L., Conant, J. & Parasuraman, A. (1991). A Framework for Conducting a Service Marketing Audit. *Journal of the Academy of Marketing Science,* 19: 255-268. https://doi.org/10.1007/BF02726500

Bontis, N. (1998). Intellectual capital: an exploratory study that develops measures and models. *Management Decision,* 36(2): 63-76.

Bontis, N., Chua, W. & Richardson, S. (2000). Intellectual capital and the nature of business in Malaysia. *Journal of Intellectual Capital,* 1 (1): 85-100.

Bontis, N. (2001). Assessing knowledge assets: a review of the models used to measure intellectual capital. *International Journal of Management Reviews*, (1): 41-60.

Bontis, N., Janoševic, S. & Dženopoljac, V. (2015). Intellectual capital in Serbia's hotel industry. *International Journal of Contemporary Hospitality Managemen*t, 2(6): 1365-1384. https://doi.org/10.1108/IJCHM-12-2013-0541

Bontis, N., & Fitz-Enz, J. (2002). Intellectual capital ROI: a causal map of human capital antecedents and consequents. *Journal of Intellectual Capital*, 3(3): 223-247. https://doi.org/10.1108/14691930210435589

Bozbura, F. T. (2004). Measurement and application of intellectual capital in Turkey. *The Learning Organization,* 11(4/5): 357–367. https://www.learntechlib.org/p/75559/.

Buenechea-Elberdin, M. (2017). Structured literature review about intellectual capital and innovation. *Journal of Intellectual Capital,* 18 (2): 262-285. https://doi.org/10.1108/JIC-07-2016-0069

Buenechea-Elberdin, M., Sáenz, J., & Kianto, A. (2018). Knowledge management strategies, intellectual capital, and innovation performance: a comparison between high-and low-tech firms. *Journal of Knowledge Management*, 22(88): 1757-1781. https://doi.org/10.1108/JKM-04-2017-0150

Bueno, E., Salmador, M. & Rodriguez, O. (2004). The Role of Social Capital in Today´s Economy: Empirical Evidence and Proposal of a New Model of Intellectual Capital. *Journal of Intellectual Capital,* 5: 556-574. https://doi.org/10.1108/14691930410567013

Cabello-Medina, C., López-Cabrales, Á., & Valle-Cabrera, R. (2011). Leveraging the innovative performance of human capital through HRM and social capital in Spanish firms. *International Journal of Human Resource Management*, 22(04): 807-828.

Cabrilo, S., & Dahms, S. (2018). How strategic knowledge management drives intellectual capital to superior innovation and market performance. *Journal of Knowledge Management,* 22(3): 621-648. https://doi.org/10.1108/JKM-07-2017-0309

Cabrita, M. D. R., & Bontis, N. (2008). Intellectual capital and business performance in the Portuguese banking industry. International *Journal of Technology Management,* 43(1-3). 212-237.

Capello, R., & Faggian, A. (2005). Collective learning and relational capital in local innovation processes. *Regional studies,* 39(1): 75-87. https://doi.org/10.1080/0034340052000320851

Calantone, R.J., Cavusgil, S.T. & Zhao, Y. (2002). Learning orientation, firm innovation capability and firm performance. *Industrial Marketing Management*, 31: 515-24. https://doi.org/10.1016/S0019-8501(01)00203-6

Cappiello, G., Giordani, F., & Visentin, M. (2020). Social capital and its effect on networked firm innovation and competitiveness. *Industrial Marketing Management.* https://doi.org/10.1016/j.indmarman.2020.03.007

Carmeli, A. & Tishler, A. (2004). The relationships between intangible organizational elements and organizational performance. *Strategic Management Journal*, 25: 1257-1278. https://doi.org/10.1002 / smj.428

Casas Novas, J. María do Céu. G., & Sousa, A. (2017). The role of management accounting systems in the development of intellectual capital. *Journal of Intellectual Capital,* 18(2): 286-315. https://doi.org/10.1108/JIC-08-2016-0079

Chahal, H. & Bakshi, P. (2015). Examining intellectual capital and competitive advantage relationship: role of innovation and organizational learning. *International Journal of Bank Marketing,* 33 (3): 376-399. https://doi.org/10.1108/IJBM-07-2013-0069

Chen, J.; Zhu, Z. y Yuan, H. (2004). Measuring intellectual capital: a new model and empirical study, *Journal of Intellectual Capital,* 5:195-212. https://doi.org/10.1108/14691930410513003

Chen, X., Zhou, Y., Probert, D. & Su, J. (2017). Managing knowledge sharing in distributed innovation from the perspective of developers: empirical study of open source software projects in China. *Technology Analysis & Strategic Management,* 29(1): 1-22.

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches.* Sage publications

Curado, C. (2008). Perceptions of knowledge management and intellectual capital in the banking industry. *Journal of Knowledge Management*, 12(3): 141 - 155. https://doi.org/10.1108/13673270810875921

Davey, J., Schneider, L.& Davey, H. (2009). Intellectual capital disclosure and the fashion industry. *Journal of Intellectual Capital*, 10(3): 401-424. https://doi.org/10.1108/14691930910977815

Dávila, G. A., Durst, S., & Varvakis, G. (2018). Knowledge absorptive capacity, innovation, and firm's performance: insights from the South of Brazil. *International Journal of Innovation Management,* 22(02)

Dávila, G. A., Andreeva, T., & Varvakis, G. (2019). Knowledge Management in Brazil: What Governance Mechanisms Are Needed to Boost Innovation. *Management and Organization Review*, 1(30): 857-886. https://doi:10.1017/mor.2019.10

Dorrego, P. F., Costa, R. V., & Fernández, C. F. J. (2013). Product innovation and relational capital: Evidence from Portugal. Electronic *Journal of Knowledge Management*, 11(4): 295.

Dost, M., Badir, Y.F., Ali, Z. & Tariq, A. (2016). The impact of intellectual capital on innovation generation and adoption. *Journal of Intellectual Capital,* 4: 675-695. https://doi.org/10.1108/JIC-04-2016-0047

Dumay, J.C. & Garanina, T. (2013). Intellectual capital research: a critical examination of the third stage. *Journal of Intellectual Capital,* 1(1): 10-25. https://doi.org/10.1108/14691931311288995

Dumay, J. (2016). A critical reflection on the future of intellectual capital: from reporting to disclosure. *Journal of Intellectual Capital,* 17(1): 168-184. https://doi.org/10.1108/JIC-08-2015-0072

Duodu, B. & Rowlinson, S. (2019). Intellectual capital for exploratory and exploitative innovation: Exploring linear and quadratic effects in construction contractor firms, *Journal of Intellectual Capital,* 20(3): 382-405. https://doi.org/10.1108/JIC-08-2018-0144

Dženopoljac, V., Janošević, S. & Bontis, N. (2016). Intellectual capital and financial performance in the Serbian ICT industry. *Journal of Intellectual Capital,* 17(2): 373-396. https://doi.org/10.1108/JIC-07-2015-0068

Edvinsson, L. & Sullivan, P. (1996). Developing a model for managing intellectual capital. *European Management Journal,* 14(4): 356-364.

Edvinsson, L. & Malone, M. (1997). *Intellectual Capital: The Proven Way to Establish YourCompany's Real Value by Measuring its Hidden Brainpower*. King's Lynn and London: Biddles Ltda.

Edvinsson, L. & Malone, M. (1997). *Intellectual Capital: Realizing Your Company's True Value by Finding its Hidden Brainpower.* New York: Harper Collins Publishers.

Engelman, R. M., Fracasso, E. M., Schmidt, S., & Zen, A. C. (2017). Intellectual capital, absorptive capacity and product innovation. *Management Decision,* 55(3): 474:490. https://doi.org/10.1108/MD-05-2016-0315

Fernández, E., Montes, JM & Vázquez, CJ (2000). Typology and strategic analysis of intangible resources: a resource-based approach. *Technovation*, 20(2): 81-92. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.464.2528&rep=rep1&type=pdf

FitzPatrick, M., Davey, J., Muller, L. & Davey, H. (2013). Value-creating assets in tourism management: applying marketing's service-dominant logic in the hotel industry. *Tourism Management*, 36: 86-98. https://doi.org/10.1016/j.tourman.2012.11.009

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1): 39 50.

Fosfuri, A., & Tribó, J. A. (2008). Exploring the antecedents of potential absorptive capacity and its impact on innovation performance. *Omega*, 36(2): 173-187. https://doi.org/10.1016/j.omega.2006.06.012

Gallego, I. y Rodríguez, L. (2005). Situation of Intangibles Assets in Spanish Firms: An Empirical Analysis. *Journal of Intellectual Capital,* 6: 105-126. https://doi.org/10.1108 / 14691930510574690

Ganesan, Shankar &Weitz. (1996). The Impact of Staffing Policies on Retail Buyer Job Attitudes and Behaviors. *Journal of Retailing*, 72 (1): 31-56. https://doi.org/10.1016/S0022-4359(96)90004-4

Global Innovation Index (GII, 2019), Report GII. https://www.globalinnovationindex.org/gii-2019-report

Goebel, V. (2015). Estimating a measure of intellectual capital value to test its determinants. *Journal of Intellectual Capital*, 16(1): 101-120. https://doi.org/10.1108/JIC-12-2013-0118

Goyzueta, S. (2013). Management model for family businesses with growth and sustainability perspectives. *Perspectives Cochabamba: Bolivian Catholic University,* 16(31): 87-132.

Granelli, A., & Robotti, O. (2016). Introduction. The rewarding value of diversity. The key to making your company stronger, more creative and competitive. *Milan: Harvard Business Review Italy*: 7-14

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis.* Uppersaddle River. NJ: Pearson Prentice Hall.

Hartline, M. & Farrell, O.C. (1996). The Management of Customer-Contact Service Employees: An empirical Investigation. *Journal of Marketing,* 60: 52-70. https://doi.org/10.2307 / 1251901

Huang, T.T., Chen, L. & Stewart, R.A. (2010). The moderating effect of knowledge sharing on the relationship between manufacturing activities and business performance. *Knowledge Management Research & Practice*, 8(4): 285-306. http://www.palgrave-journals.com/kmrp/journal/v8/n4/abs/kmrp201021a.html

Hipp, C., & Grupp, H. (2005). Innovation in the service sector: The demand for service-specific innovation measurement concepts and typologies. *Research policy,* 34(4): 517-535. https://doi.org/10.1016/j.respol.2005.03.002

INEC (2011). *Economic census results. Ecuador*: Presentation of Loja. Recovered from: https://www.ecuadorencifras.gob.ec.

Inkinen, I. (2015). Review of empirical research on intellectual capital and firm performance. *Journal of Intellectual Capital,* 16(3): 518 – 565. https://doi.org/10.1108/JIC-01-2015-0002

IRSE (2007). Indice de Responsabilidad Social – ACDE – DERES, ACDE, Montevideo.

Jardon, C. M., & Susana Martos, M. (2012). Intellectual capital as competitive advantage in emerging clusters in Latin America. *Journal of Intellectual Capital,* 13(4): 462-481. https://doi.org/10.1108/14691931211276098.

Jordão, R. & Novas, J. (2017). Knowledge management and intellectual capital in networks of small and medium-sized enterprises. *Journal of Intellectual Capital*, 18(3): 667-692. https://doi.org/10.1108/JIC-11-2016-0120

Keong Choong, K. (2008). Intellectual capital: definitions, categorization and reporting models. *Journal of Intellectual Capital,* 9(4): 609-638. https://doi.org/10.1108/14691930810913186

Kianto, A., Hurmelinna-Laukkanen, P. & Ritala, P. (2010). Intellectual capital in service-and product-oriented companies. *Journal of Intellectual Capital*, 11(3): 305-325. https://doi.org/10.1108/14691931011064563

Kianto, A., Sáenz, J., & Aramburu, N. (2017). Knowledge-based human resource management practices, intellectual capital and innovation. *Journal of Business Research,* 81: 11-20. https://doi.org/10.1016/j.jbusres.2017.07.018

Kim, T., Kim, W. G., Park, S. S. S., Lee, G., & Jee, B. (2012). Intellectual Capital and Business Performance: What Structural Relationships Do They Have in Upper-Upscale Hotels?. *International Journal of Tourism Research,* 14(4): 391-408. https://doi.org/10.1002/jtr.1868

Kujansivu, P. & Lönnqvist, A. (2007). Investigating the value and efficiency of intellectual capital. Journal of Intellectual Capital, 8(2): 272-287. https://doi.org/10.1108/14691930710742844

Lev, B. (2001). *Intangibles: Management, Measurement, and Reporting,* Washington, DC: Brookings Institution Press.

Lin, D. J., Yu, W. D., Wu, C. M., & Cheng, T. M. (2018). Correlation between intellectual capital and business performance of construction industry–an empirical study in Taiwan. *International Journal of Construction Management,* 18(3): 232-246. https://doi.org/10.1080/15623599.2017.1315528

López, E. (2013). Women in companies, professions and non-traditional occupations: The experience of Puerto Rico. *Global Conference on Business and Finance Proceedings*, 8(2): 1564-1574.

McGregor, J., Tweed, D. & Pech, R. (2004). Human capital in the new economy: devil's bargain. *Journal of Intellectual Capital,* 5(1): 153-164. https://doi.org/10.1108/14691930410512978

Machado R., Fracasso, E., Schmidt, S. & Carneiro, A. (2017). Intellectual capital, absorption capacity and product innovation. *Management Decision*, 55(3): 474-490. https://doi.org/10.1108 / MD-05-2016-0315

Mariz-Perez, RM, Teijeiro-Alvarez, MM & Garcia-Alvarez, MT (2012). The relevance of human capital as an engine of innovation. *Cuadernos de Economía,* 35(98): 68-76.

Marqués, D. P., Simón, F. J. G., & Carañana, C. D. (2006). The effect of innovation on intellectual capital: an empirical evaluation in the biotechnology and telecommunications industries. *International Journal of Innovation Management,* 10(01): 89-112. https://pdfs.semanticscholar.org/4dcd/3a5bcacfc44ef200834c01c647503c56086a.pdf

Marr, B., Schiuma, G. & Neely, A. (2004). Intellectual capital–defining key performance indicators for organizational knowledge assets. *Business Process Management Journal,* 10(5): 551-569. https://doi.org/10.1108/14637150410559225

Martín-de-Castro, G., Delgado-Verde, M., López-Sáez, P. & Navas-López, J.E. (2011). Towards an intellectual capital-based view of the firm: origins and nature. *Journal of Business Ethics,* 98(4): 649-662. https://doi.org/10.1007/s10551-010-0644-5

Martinez-Torres, M. (2006). A procedure to design a structural and measurement model of intellectual capital: an exploratory study. *Information & Management*, 43(5): 617-626. https://doi.org/10.1016/j.im.2006.03.002

Matricano, D. (2016). The impact of intellectual capital on start-up expectations. *Journal of Intellectual Capital,* 17(4): 654-674. https://doi.org/10.1108/JIC-04-2016-0040

Maurer, I., Bartsch, V., & Ebers, M. (2011). The value of intra-organizational social capital: How it fosters knowledge transfer, innovation performance, and growth. *Organization Studies,* 32(2): 157-185. https://doi.org/10.1177/0170840610394301

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychological theory.* New York, NY: MacGraw-Hill: 131 147.

Nazari, J.A. & Herremans, I.M. (2007). Extended VAIC model: measuring intellectual capital components. *Journal of Intellectual Capital*, 8(4): 595-609. https://doi.org/10.1108/14691930710830774

Peña, I. (2002). Intellectual capital and business start-up success. *Journal of Intellectual Capital,* 3(2): 180-198. https://doi.org/10.1108/14691930210424761

Petty, R. & Cuganesan, S. (2005). Voluntary disclosure of intellectual capital by Hong Kong companies: examining the size, industry and growth effects over time. *Australian Accounting Review*, 15(2): 40 -7. https://doi.org/10.1111 / j.1835-2561. 2005.tb00291.x

Roberts, H. (2003). Management accounting and the knowledge production process in Bhimani, *Management Accounting in the Digital Economy*, Oxford University Press: 260-283

Rodríguez-Suárez, P., Pico-González, B., & Méndez-Ramírez, F. (2013). Innovative capacity in the family business as an area of opportunity towards the development of Mexico. Economy*, Society and Territory*, 13(43): 779-794. http://www.scielo.org.mx/pdf/est/v13n43/v13n43a9.pdf

Roos, J., Roos, G., Dragonetti, N. & Edvinsson, L. (1997). *Intellectual Capital: Navigating the New Business Landscape*, London: Macmillan Press Ltda. https://www.palgrave.com/gp/book/9780333694794

Roos, G. (2017). Knowledge management, intellectual capital, structural holes, economic complexity and national prosperity. *Journal of Intellectual Capital,* 18(4): 745-770. https://doi.org/10.1108/JIC-07-2016-0072

Rudež, H. N., & Mihalič, T. (2007). Intellectual capital in the hotel industry: A case study from Slovenia. *International Journal of Hospitality Management*, 26(1): 188-199. https://doi.org/10.1016/j.ijhm.2005.11.002

Sayyed A. (2018) Antecedents and consequences of intellectual capital: The role of social capital, knowledge sharing and innovation. *Journal of Intellectual Capital,* 19(5): 858-874. https://doi.org/10.1108/JIC-05-2017-0068

Schilling, M. (2011). *Strategic management of technological innovation.* Nueva York: McGraw Hill,

Schumpeter, J. (1927). The explanation of the business cycle. *Economica,* 21: 286–311.

Seleim, A., Ashour, A. & Bontis, N. (2004). Intellectual capital in Egyptian software firms. *The Learning Organization,* 11: 332-346. https://doi.org/10.1108/09696470410538233

Sharabati, A., Jawad, S. & Bontis, N. (2010). Intellectual capital and business performance in the pharmaceutical sector of Jordan. Management Decision, 48(1): 105-131. https://doi.org/10.1108/00251741011014481

Song, M. & Parry, M. (1993). R&D Marketing Integration in Japanese High-Technology Firms: Hypothesis and Empirical Evidence, *Journal of the Academy of Marketing Science*, 21:125-133. https://doi.org/10.1007/BF02894423

Starovic, D. & Marr, B. (2004). *Understanding Corporate Value: Managing and Reporting Intellectual Capital. London:* The Chartered Institute of Management Accountants (CIMA) and Cranfield University.

Stewart, T.A. & Losee, S. (1994). Your company's most valuable asset: intellectual capital. *Fortune,* 130(3): 68-73.

Stewart, T.A (1997). *Intellectual Capital: The New Wealth of Organizations, Currency and Doubleday,* New York: London.

Subramaniam, M. & Youndt, M.A. (2005). The influence of intellectual capital on the types of innovative capabilities. *Academy of Management Journal,* 48(3): 450-464. https://doi.org/10.5465/amj.2005.17407911

Sullivan, P. H. (1998). *Profiting from intellectual capital: Extracting value from innovation. John* Wiley & Sons.

Sullivan, P.H. (2000), *Value-Driven Intellectual Capital: How to Convert Intangible Corporate Assets into Market Value.* New York: Wiley. https://doi.org/10.1108 / 14691930010359234

Superintendencia de Compañías Valores y Seguros. (2020). Statistics https://www.supercias.gob.ec/portalscvs/

Teece, DJ (2010). Business models, business strategy and innovation. *Long Range Planning,* 43: 172–194. https://doi.org/10.1016/j.lrp.2009.07.003

Tippins, M. & Sohi, R. (2003). It competency and firm performance: Is organizational learning a missing link?. *Strategic Management Journal*, 24: 745-761.

Tootifar Tehranpoor, M. & Ziya, B. (2014). The effect of intellectual capital to small Sport businesses innovative in Tehran. *Entrepreneurship Development,* 7(2): 254-269. https://doi.org/10.1002 / smj.337

Trequattrini, R., Nappo F., Lardo A. & Cuozzo B. (2018). Intellectual Capital and Gender Capital: The Case of Italian Universities. In: Paoloni P., Lombardi R. (eds) Gender Issues in Business and Economics. Springer Proceedings in Business and Economics. Springer, Cham

Ulrich, D., Zenger, J. & Smallwood, N. (1999). *Results Based Leadership.* Boston. Harvard Business School Press,

Verbano, C. & Crema, M. (2016). Linking technology innovation strategy, intellectual capital and technology innovation performance in manufacturing SMEs. *Technology Analysis & Strategic Management*, 28(5): 524-540. https://doi.org/10.1080/09537325.2015.1117066

Warn, J. (2005). Intangibles in commercialisation: The case of Air Navigation Services in the South Pacific. *Journal of Intellectual Capital*, 6(1): 72-88. https://doi.org/10.1108/14691930510574672

Wee, J.C. & Chua, A.Y. (2016). The communication of intellectual capital: the 'whys' and 'whats'. *Journal of Intellectual Capital,* 17 (3): 414-438. https://doi.org/10.1108/JIC-01-2016-0007

Weerawardena, J. (2003). The role of marketing capability in innovation-based competitive strategy. *Journal of strategic marketing,* 11(1): 15-35. https://doi.org/10.1080/0965254032000096766

World Bank (2020). Data. https://datos.bancomundial.org/indicator/NY.GDP.MKTP.KD.ZG?locations=EC

Yli-Renko, H., Autio, E. & Sapienza, H. (2001). Social Capital, Knowledge Acquisition, and Knowledge Exploitation in Young Technology-based Firms, *Strategic Management Journal,* 22: 587-613. https://www.jstor.org/stable/3094322

Youndt, M., Subramanian, M. & Snell, S. (2004). Intellectual capital profiles: An examination of investments and returns. *Journal of Management Studies*, 42: 335-361. https://doi.org/10.1111/j.1467-6486.2004.00435.x

Xu, J., & Li, J. (2019). The impact of intellectual capital on SMEs' performance in China. *Journal of Intellectual Capital,* 20 (4): 88-509. https://doi.org/10.1108/JIC-04-2018-0074

Zerenler, M., Hasiloglu, S. B., & Sezgin, M. (2008). Intellectual capital and innovation performance: empirical evidence in the Turkish automotive supplier. *Journal of technology management & innovation,* 3(4): 31-40. http://dx.doi.org/10.4067/S0718-27242008000200003

Zhang, H.Y. & Lv, S. (2015). Intellectual capital and technological innovation: the mediating role of supply chain learning. International. *Journal of Innovation Science,* 7 (3):199-210. https://doi.org/10.1260/1757-2223.7.3.199

Appendix. Statistical assessment of the instrument to measure IC in companies in Ecuador.

INDICATORS	HC	SC	RC	Variance Inflation Factors (VIF)	AUTHORS
HUMAN CAPITAL (HC)					
H1. Employee commitment	0.861	0.587	0.556	4.266	Ganesan et al. (1996); Babin & Boles (1996)
H2. Tasks within deadlines	0.809	0.511	0.512	3.532	Kianto, A. (2008)
H3. Recognition of efforts and improvements	0.720	0.499	0.461	2.178	Mention & Bontis (2013), Edvinsson & Malone (1997)

H4. Positive attitude to change	0.761	0.539	0.597	3.080	Mention and Bontis (2013), Edvinsson and Malone (1997)
H5. Continuing education	0.770	0.566	0.535	3.418	Sharabati et al. (2010)
H6. Degree of initiative for improvement	0.785	0.518	0.566	2.720	Sharabati et al. (2010)
H7. Satisfaction towards subordinates	0.767	0.562	0.505	2.574	Carmeli (2004)
H8. Adaptation to changes	0.719	0.691	0.628	2.100	Hartline & Ferrell (1996)
H9. Competition for the position	0.734	0.723	0.613	2.267	Bontis (1998), Carmeli & Tishler (2004)
H10. Development of creativity	0.762	0.574	0.613	2.748	Bontis (1998), Youndt et al. (2004)
H11. Staff rotation	0.351	0.177	0.158	1.235	Carmeli & Tishler (2004)
STRUCTURAL CAPITAL (SC)					
E1. Periodic review of the strategic plan	0.385	0.646	0.450	2.492	IRSE (2007)
E2. Coordination of departments	0.583	0.784	0.660	2.980	Berry (1991)
E3. Knowledge of activities at all levels	0.626	0.786	0.673	2.276	Ulrich et al. (1999)
E4. Incentive to create something new	0.701	0.734	0.560	2.065	Song and Parry (1993)
E5. Working environment	0.695	0.746	0.589	2.254	Kianto (2018)
E6. Description of procedures	0.446	0.717	0.618	2.233	Tippins & Sohi (2003), Youndt, Subramanian & Snell (2004)
E7. Database	0.495	0.759	0.581	2.677	IRSE (2007)
E8. Information storage and processing	0.450	0.712	0.533	2.413	Tippins & Sohi (2003)
E9. Computer systems	0.392	0.606	0.433	1.885	Tippins & Sohi (2003)
E10. Use of patents and/or licenses	0.240	0.411	0.479	1.434	Youndt, Subramanian & Snell (2004)
RELATIONAL CAPITAL (RC)					
R1. Customer retainment	0.604	0.670	0.796	2.565	Chen et al. (2004), Gallego & Rodríguez (2005)
R2. Relationship with customers	0.627	0.701	0.815	2.372	Yli-Renko et al. (2001)
R3. Relationship with suppliers	0.420	0.603	0.680	1.978	Gallego & Rodríguez (2005), Warn (2005)
R4. Assessment of competitors	0.327	0.541	0.595	1.609	Youndt, Subramanian & Snell (2004)
R5. Cooperation agreements with the sector	0.380	0.326	0.571	1.448	Bontis (1998), Peña (2002), Bueno et al. (2004)
R6. Relationship with universities, institutes or innovation centers	0.443	0.370	0.646	1.916	CIC (2003)
R7. Knowledge of community needs	0.490	0.463	0.685	2.100	IRSE (2007)
R8. Socially responsible company	0.703	0.757	0.836	2.352	Carmeli & Tishler (2004), Gallego & Rodríguez (2005)

Source: Results of the study.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Mariuxi PARDO-CUEVA, PhD candidate in Administration - National University of Rosario (Argentina). Master in Integral Audit - UTPL. Engineer in "Accounting and Audit" - UTPL. Diploma in Quality Management Audit - UTPL. Diploma in Taxation - UTPL. Work experience: 3 years as an accounting assistant and accountant, also responsible for the purchasing and human resources areas of Ediloja Cía. Ltda. Undergraduate and postgraduate university professor for 11 years in the areas of General Accounting, Audit, Management Accounting, Productive Management, Practicums. Coordinator of the Accounting and Audit degree 2014-2016. Member of the research group Knowledge Management in Organizations (GCO). Teacher: full-time researcher of the Department of Business Sciences, Accounting and Audit Section of the UTPL.
ORCID ID: orcid.org/ 0000-0003-3769-2242

Guillermo Antonio DAVILA, PhD. is Senior Researcher in the Knowledge Engineering Department (www.ngs.ufsc.br) at Federal University of Santa Catarina, UFSC, Florianópolis, Brasil; and Visiting Professor at Universidad Técnica Particular de Loja - UTPL, Ecuador. He has more than 10 years of experience in consultancy, insurance, banking, and public sectors, working in different areas (e.g. FDI attraction, operations management, technology management, technology transfer, KM maturity assessment, innovation management). His research focus is on knowledge management, innovation, and technology transfer between SMEs, KM practices for innovation, and knowledge absorptive capacity. He works as a reviewer for International Journal of Innovation Management, and Brazilian Business Review. His work has been published in Brazilian and international peer-reviewed journals, and he has been awarded at the IFKAD 2017 and 2019 conferences.
ORCID ID: orcid.org/ 0000-0002-1479-2585

Laura Magali CHAMBA-RUEDA, PhD student in Administration at the University of Rosario-Argentina. Master in Business Management, Business Administration Engineer at the Universidad Técnica Particular de Loja - Ecuador. University teacher (undergraduate components: Quality Management, Financial Mathematics, Business Case Analysis, Entrepreneurship and Administration. Postgraduate components: Implementation of a Quality Management System, Implementation of the ISO 26000 standard). Responsible credit experience at Banco Centro Mundo, Financial Assistant at ECOLAC, Research Manager at a call center, Master's Degree Coordinator in Quality Management and Business Management.
ORCID ID: orcid.org/ 0000-0002-4882-0070

A MULTIOBJECTIVE CREDIBILISTIC PORTFOLIO SELECTION MODEL. EMPIRICAL STUDY IN THE LATIN AMERICAN INTEGRATED MARKET

Fernando García [1], Jairo González-Bueno [2], Francisco Guijarro [3], Javier Oliver [4]

[1,4] *Department of Economics and Social Sciences, Universitat Politècnica de València, Valencia, 46022, Spain*
[2] *Faculty of Business Administration, Universidad Pontificia Bolivariana, Bucaramanga, 681017, Colombia*
[3] *I.U. de Matemàtica Pura i Aplicada, Universitat Politècnica de València, Valencia, 46022, Spain*

E-mails:[1] fergarga@esp.upv.es; [2] jairoa.gonzalez@upb.edu.co; [3] fraguima@upvnet.upv.es; [4] jaolmun@ade.upv.es

Abstract. This paper extends the stochastic mean-semivariance model to a fuzzy multiobjective model, where apart from return and risk, also liquidity is considered to measure the performance of a portfolio. Uncertainty of future return and liquidity of each asset are modeled using L-R type fuzzy numbers that belong to the power reference function family. The decision process of this novel approach takes into account not only the multidimensional nature of the portfolio selection problem but also realistic constraints by investors. Particularly, it optimizes the expected return, the semivariance and the expected liquidity of a given portfolio, considering cardinality constraint and upper and lower bound constraints. The constrained portfolio optimization problem resulting is solved using the algorithm NSGA-II. As a novelty, in order to select the optimal portfolio, this study defines the credibilistic Sortino ratio as the ratio between the credibilistic risk premium and the credibilistic semivariance. An empirical study is included to show the effectiveness and efficiency of the model in practical applications using a data set of assets from the Latin American Integrated Market.

1. Introduction

Multi-criteria decision making includes a group of operational research methods that pursue decision making in the presence of multiple criteria, goals, or objectives. This type of method differs from traditional single-objective operational research methods and is intended to support decision makers in the simultaneous optimization of several objectives that usually conflict with each other (Čižo et al., 2020) and those related to financial investments are not an exception (Aznar & Guijarro, 2016; García et al., 2013, 2018; García, González-Bueno,

Oliver, & Riley, 2019; Masood et al., 2019). A characteristic example of multi-criteria decision making is the portfolio selection problem.

Portfolio selection is concerned with the allocation of investor's wealth amongst different types of financial securities. The main goal is to minimize the risk of terminal wealth while the expected terminal wealth equals a prescribed level. The first breakthrough work on this topic was the seminal mean-variance model by Markowitz, (1952). In this classical work, Markowitz used the mathematical expectation of the portfolio's return and its variance as the return and the risk measures, respectively. However, when portfolio returns are typically asymmetric, the variance becomes a less appropriate risk measure, because it considers high returns that investors want as equally undesirable as low returns that investors dislike (Li & Qin, 2014). In other words, both risk measures penalize extreme upside (gains) and downside (losses) deviations from the expected return (Gupta, Mittal, et al., 2013). In order to solve this problem, several downside risk measures (i.e. measures that only consider the negative deviations from a reference return level) have been proposed: semivariance (Markowitz, 1959), lower partial moment (Bawa, 1975; Fishburn, 1977), semi-absolute deviation (Speranza, 1993), value at risk (VaR) (J.P.Morgan, 1996), and conditional value at risk (CVaR) (Rockafellar & Uryasev, 2000, 2002). Semivariance is one of the most commonly accepted downside risk measures. Its main advantage over variance is that it does not consider values beyond the critical value (i.e. gains) as risk (Gupta, Mittal, et al., 2013). Furthermore, it is a more appropriate risk measure when an investor is concerned about underperformance rather than over performance of the portfolio (Markowitz et al., 1993).

The traditional portfolio optimization model focuses only on the risk-return trade-off (García et al., 2015; Markowitz, 1952; Speranza, 1993). However, it is important to consider other criteria which might generate equal or greater satisfaction level for investors. By considering other criteria in the portfolio selection model, it may be possible to obtain portfolios in which a less favorable return or risk is compensated by portfolio's performance as measured by other criteria (Gupta, Inuiguchi, et al., 2013).

Other than return and risk, liquidity is also one of the main concerns for investors when making decisions. Liquidity has been considered as a fuzzy variable on portfolio decision-making in previous studies (Arenas-Parra et al., 2001; Gupta et al., 2008, 2010, 2011; Jalota et al., 2017a, 2017b). Generally, investors' preference is to own portfolios that contain liquid assets which can be easily liquidated in the future. Therefore, it is reasonable to include liquidity as an additional criterion in the mean-semivariance base model, in order to make this model more realistic and usable in a real situation.

In most of the above-referred studies, asset returns were assumed to be a random variable, and portfolio selection models were developed under the assumption that future asset performance may be correctly captured by past asset performance. However, stock markets are complex and randomness is not the only type of uncertainty actually (Huang, 2010). Moreover, stock markets are affected by vagueness and ambiguity associated to linguistic expressions such as "high risk", "low profit" and "low liquidity" used by investors and investment experts (Gupta, Inuiguchi, et al., 2013; Gupta, Mittal, et al., 2013). Owing to vague and ambiguous information, the fuzzy set theory (Zadeh, 1965) has been used for capturing and modeling the information about investor's subjective preferences in portfolio investment. Assuming that returns are fuzzy, a vast literature is available applying possibility measures on the portfolio selection problem (Carlsson et al., 2002; Vercher et al., 2007; Vercher & Bermúdez, 2012; Wang & Zhu, 2002). Although possibility measures are widely used, they are not self-dual (Huang, 2008, 2009, 2010). As an alternative, Liu and Liu (B. Liu & Liu, 2002) proposed a self-dual credibility measure to overcome the limitations of the possibility measure. Since then, some researchers suggest modeling

assets return using credibility measures (García, González-Bueno, Oliver, & Tamošiūnienė, 2019; Huang, 2006a, 2010, 2006b; Jalota et al., 2017a; Mehlawat, 2016; Vercher & Bermúdez, 2015).

An important aspect to consider in fuzzy portfolio optimization is the shape of the membership functions that will best fit the historical asset performance data. Portfolio selection models based on fitting of L-R fuzzy numbers (González-Bueno, 2019; Jalota et al., 2017a; Saborido et al., 2016; Vercher & Bermúdez, 2013, 2015) model the uncertainty of the return on a given portfolio directly instead of using the combination of uncertainties of the individual assets. There are only few studies which model the return of each asset by L-R fuzzy numbers (Jalota et al., 2017b; Vercher, 2008; Vercher et al., 2007). In this paper, we extend the literature on multiobjective portfolio selection model by assuming that the return on each asset is an L-R power fuzzy variable.

Another issue is that portfolio decision-making based on fitting of L-R fuzzy numbers is usually developed in a possibilistic environment. In fact, to the best of our knowledge, there are only three studies which treat portfolio return by means of credibility distributions (Jalota et al., 2017a, 2017b; Vercher & Bermúdez, 2015). Credibility measures are consistent with the law of excluded middle and the law of contradiction (i.e., they have the self-duality property), which is needed both in theory and in practice. In this way, it is fundamental to study their application as the basic measure of the occurrence of a fuzzy event in the portfolio selection problem.

Most portfolio optimization models in the literature have been evaluated in financial markets such as the Madrid Stock Exchange (Spain) (Bermúdez et al., 2012), the National Stock Exchange of Mumbai (India) (Mehlawat, 2016), the Shanghai Stock Exchange (China) (Ren et al., 2017) and the New York Stock Exchange (USA) (J. Liu et al., 2015), among others. To the best of our knowledge there are not empirical studies that have been developed in Latin American capital markets. Thus, this study makes a contribution to the literature by applying a portfolio optimization model in the Latin American Integrated Market (MILA by its Spanish acronym) which integrates the stock exchange markets of Chile, Colombia, Mexico, and Peru.

The concept of optimal portfolio falls under modern portfolio theory (Markowitz, 1952). It assumes that investors act rationally and always try to minimize risk while striving for the highest return possible. One well-known measure to evaluate portfolio performance is the Sortino ratio (Sortino & Price, 1994). It is a modification of the Sharpe ratio and focuses on returns that are below a certain threshold. The Sortino ratio exhibits more power and less bias than the Sharpe ratio when the distribution of excess returns is skewed. In order to select the optimal portfolio, in this paper we define for the first time the credibilistic Sortino ratio as the ratio between the credibilistic risk premium and the credibilistic semivariance.

In this paper, the stochastic mean-semivariance portfolio selection model is extended to a credibilistic multiobjective model, where apart from return and risk, also liquidity is considered to measure portfolio performance. Return and liquidity are considered as L-R power fuzzy variables. The decision process of this novel approach considers not only the multidimensional nature of the portfolio selection problem but also realistic constraints required by investors. Concretely, it optimizes the expected return, the semivariance and the expected liquidity of a given portfolio, considering budget, bound and cardinality constraints. The introduction of these realistic constraints convert the problem into a constrained multi-objective problem that is NP-hard, and traditional methods of optimization cannot be used to find efficient portfolios. To overcome this problem, the Non-dominated Sorting Genetic Algorithm II (NSGA-II) is applied. An empirical study is presented to show the effectiveness and efficiency of the proposed approach.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

The remainder of the paper is structured as follows: Section 2 introduces some basic definitions and notations regarding L-R fuzzy numbers and the credibility theory. Section 3 describes the multiobjective credibilistic mean-semivariance-liquidity (MCMSL) portfolio selection model. Section 4 presents the solution methodology to solve the above model with the NSGA-II algorithm. Section 5 illustrates our proposal with an empirical study using a data set from the MILA Market. Finally, the main conclusions are drawn in Section 6.

2. L-R Fuzzy numbers and credibility theory

This section briefly presents some essential definitions regarding L-R fuzzy numbers and the credibility theory for a better understanding of the proposed multiobjective credibilistic mean-semivariance-liquidity portfolio selection model that is introduced in section 3.

2.1. L-R Power fuzzy numbers
Definition 1. Functions L, R (Dubois & Prade, 1980). The functions $L, R{:}[0,1]{\rightarrow}[0,1]$ are reference functions of a fuzzy number $\tilde{A}=\left(x, \mu_{\tilde{A}}\left(x\right)\right)$, they satisfy the following conditions:
(i) $L(1) = R(1) = 0$, $L(0) = R(0) = 1$
(ii) $L(x)$ and $R(x)$ are strictly decreasing and upper semicontinuous functions.

Definition 2. L-R Fuzzy number (Dubois & Prade, 1980). A fuzzy number $\tilde{A}$ [i.e. $\tilde{A}=(a, b, c, d)_{L_{\pi}R_{\rho}}$] is said to be an L-R fuzzy number if its membership function has the following form:

$$\mu_{\tilde{A}}\left(x\right)=\begin{cases} L_{\pi}\left(\dfrac{b-x}{b-a}\right), & \text{If } a{\leq}x{<}b \\ 1, & \text{If } b{\leq}x{\leq}c \\ R_{\rho}\left(\dfrac{x-c}{d-c}\right), & \text{If } c{<}x{\leq}d \\ 0, & \text{Otherwise} \end{cases}$$

where (b – a) and (d – c) show the left and right spreads of $\tilde{A}$, respectively; $[b, c]$ is the core of $\tilde{A}$, i.e., $[b, c]=\{x/\mu_{\tilde{A}}\left(x\right)=1\}$; L_{π} and R_{ρ} are the reference functions that define the left and right shapes of $\tilde{A}$, respectively. Following Jalota et al. (2017a), this study considers the reference functions of the power family of positive parameters π and ρ, where $L_{\pi}(k)=1-x^{\pi}$, and $R_{\rho}(k)=1-x^{\rho}$, respectively. Throughout this paper, L-R power fuzzy numbers will be denoted by $\tilde{A}=(a, b, c, d)_{\pi,\rho}$.

2.2 Credibility theory
Credibility theory, founded by B. Liu (2004) y refined by B. Liu (2007), is a branch of mathematics that studies the behavior of fuzzy phenomena.

Definition 3. Credibility measure (B. Liu & Liu, 2002). Let ξ be a fuzzy variable with membership function μ, and x a real number. The credibility measure of a fuzzy event, characterized by $\xi \leq x$, is defined by eq. (1).

$$Cr\{\xi{\leq}x\}= \frac{1}{2}\left(\sup_{y{\leq}x}\mu(y)+ 1-\sup_{y{>}x}\mu(y)\right), \quad \forall x{\in}R \tag{1}$$

The credibility measure $Cr\{\xi{\leq}x\}$ of L-R power fuzzy numbers is obtained deriving the eq. (1) (Jalota et al., 2017a):

$$Cr\{\xi \leq x\} = \begin{cases} 0, & \text{If } x \leq a \\ \frac{1}{2}\left(1 - \left(\frac{b-x}{b-a}\right)^{\pi}\right), & \text{If } a < x < b \\ \frac{1}{2}, & \text{If } b \leq x \leq c \\ \frac{1}{2}\left(1 + \left(\frac{x-c}{d-c}\right)^{\rho}\right), & \text{If } c < x < d \\ 1, & \text{If } d \leq x \end{cases}$$

As $Cr\{\xi > x\} = 1 - Cr\{\xi \leq x\}$, therefore

$$Cr\{\xi > x\} = \begin{cases} 1, & \text{If } x \leq a \\ \frac{1}{2}\left(1 + \left(\frac{b-x}{b-a}\right)^{\pi}\right), & \text{If } a < x < b \\ \frac{1}{2}, & \text{If } b \leq x \leq c \\ \frac{1}{2}\left(1 - \left(\frac{x-c}{d-c}\right)^{\rho}\right), & \text{If } c < x < d \\ 0, & \text{If } d \leq x \end{cases}$$

Definition 4. Expected value (B. Liu & Liu, 2002). Let ξ be a fuzzy variable. Then the expected value of ξ is defined by eq. (2) provided that at least one of the two integrals is finite.

$$E(\xi) = \int_0^{+\infty} Cr\{\xi \geq x\} dx - \int_{-\infty}^0 Cr\{\xi \leq x\} dx \tag{2}$$

The crisp equivalent expression for the credibilistic expected value of an L-R power fuzzy number is obtained deriving eq. (2) (Jalota et al., 2017a):

$$E(\xi) = \frac{1}{2}\left[b + c + \frac{\rho(d-c)}{\rho+1} - \frac{\pi(b-a)}{\pi+1}\right] \tag{3}$$

Definition 5. Semivariance (B. Liu & Liu, 2002). Let ξ be a fuzzy variable with finite expected value $e = E[\xi]$. Then the semivariance of ξ is defined by eq. (4).

$$SV[\xi] = E\left[([\xi-e]^-)^2\right] \tag{4}$$

where,

$$[\xi-e]^- = \begin{cases} \xi-e, & \text{Si } \xi \leq e \\ 0, & \text{Si } \xi > e \end{cases}$$

Finally, the crisp equivalent expression for the credibility-measure-based semivariance of an L-R power fuzzy number was derived by Jalota et al. (2017a):

$$SV(\xi)=\begin{cases} \dfrac{(e-a)^2}{2} - \dfrac{(e-a)(b-a)}{\pi+1} + \dfrac{(b-a)^2}{(\pi+1)(\pi+2)} + \dfrac{(e-c)^{\rho+2}}{(d-c)^\rho(\rho+1)(\rho+2)}, & \text{If } c<e\leq d \\[2ex] \dfrac{(e-a)^2}{2} - \dfrac{(e-a)(b-a)}{\pi+1} + \dfrac{(b-a)^2}{(\pi+1)(\pi+2)}, & \text{If } b<e\leq c \\[2ex] \dfrac{(e-a)^2}{2} - \dfrac{(e-a)(b-a)}{\pi+1} - \dfrac{(b-e)^{\pi+2}}{(b-a)^\pi(\pi+1)(\pi+2)} + \dfrac{(b-a)^2}{(\pi+1)(\pi+2)}, & \text{If } a<e\leq b \\[2ex] 0 & \text{Otherwise} \end{cases} \qquad (5)$$

3. Multiobjective credibilistic mean-semivariance-liquidity portfolio selection model

In this section, the proposed mathematical model to solve the multiobjective portfolio selection problem in the light of the credibility theory is discussed. The parameters and variables used in this study to formulate this model are:

Parameters

ξ_{r_i}: fuzzy rate of return of the i-th asset denoted by an L-R power fuzzy number $\xi_{r_i}=\left(a_{r_i}, b_{r_i}, c_{r_i}, d_{r_i}\right)_{\pi_{r_i}, \rho_{r_i}}$,

ξ_{l_i}: fuzzy liquidity of the i-th asset denoted by an L-R power fuzzy number $\xi_{l_i}=\left(a_{l_i}, b_{l_i}, c_{l_i}, d_{l_i}\right)_{\pi_{l_i}, \rho_{l_i}}$,

ξ_{r_p}: fuzzy expected return of the portfolio denoted by an L-R power fuzzy number $\xi_{r_p}=\left(a_{r_p}, b_{r_p}, c_{r_p}, d_{r_p}\right)_{\pi_{r_p}, \rho_{r_p}}$,

e: expected return of the portfolio,
u_i: maximal fraction of the capital allocated to the i-th asset ,
l_i: minimal fraction of the capital allocated to the i-th asset ,
k : number of assets in the portfolio.

Decision variables

ω_i: proportion of the total funds invested in the i-th asset,
y_i: a binary variable indicating whether the i-th asset is contained in the portfolio. It takes value 1, if the i-th asset is included in the portfolio, otherwise takes value 0.

3.1 Objective functions
Return
Considering that in financial markets several non-probabilistic factors may affect asset returns, this paper assumes that an investor has decided to allocate his/her total wealth among n risky assets that offer fuzzy returns. The core, support and shape parameters of the fuzzy return of each asset are obtained from the empirical percentiles of their historical returns (Vercher, 2008; Vercher & Bermúdez, 2012, 2013, 2015). The support of ξ_{r_i}, that is, the interval $[a_{r_i}, d_{r_i}]$ is given by the 3th and 97th percentile, respectively. The core of ξ_{r_i}, that is, the interval $[b_{r_i}, c_{r_i}]$ is given by the 45th and 55th percentile, respectively. The positive shape parameters π_{r_i} and ρ_{r_i} are obtained in such a way that the fuzzy and empirical quartiles coincide, that is, $\pi_{r_i}=\dfrac{\text{Ln } 0.5}{\ln s}$, where $s=\dfrac{b_{r_i}- 25\text{th percentile}}{b_{r_i}- a_{r_i}}$, and $\rho_{r_i}=\dfrac{\text{Ln } 0.5}{\ln h}$, where $h=\dfrac{75\text{th percentile } - c_{r_i}}{d_{r_i}- c_{r_i}}$. Then, the maximization of the expected return of the portfolio can be expressed as:

$$\text{Max } F_1(\omega_i)=\sum_{i=1}^{n}\left[\left[\frac{1}{2}\left[b_{r_i}+c_{r_i}+\frac{(d_{r_i}-c_{r_i})\rho_{r_i}}{\rho_{r_i}+1}-\frac{(b_{r_i}-a_{r_i})\pi_{r_i}}{\pi_{r_i}+1}\right]\right]\omega_i\right] \qquad (6)$$

Risk

Portfolio risk is estimated by means of the semivariance measure. Thus, the minimization of semi-variance of the portfolio can be expressed as:

$$\text{Min } F_2(\omega_i)=\begin{cases}\dfrac{(e-a_{r_p})^2}{2}-\dfrac{(e-a_{r_p})(b_{r_p}-a_{r_p})}{\pi_{r_p}+1}+\dfrac{(b_{r_p}-a_{r_p})^2}{(\pi_{r_p}+1)(\pi_{r_p}+2)}+\dfrac{(e-c_{r_p})^{\rho_{r_p}+2}}{(d_{r_p}-c_{r_p})^{\rho_{r_p}}(\rho_{r_p}+1)(\rho_{r_p}+2)}, & \text{If } c_{r_p}<e\leq d_{r_p}\\[2ex] \dfrac{(e-a_{r_p})^2}{2}-\dfrac{(e-a_{r_p})(b_{r_p}-a_{r_p})}{\pi_{r_p}+1}+\dfrac{(b_{r_p}-a_{r_p})^2}{(\pi_{r_p}+1)(\pi_{r_p}+2)}, & \text{If } b_{r_p}<e\leq c_{r_p}\\[2ex] \dfrac{(e-a_{r_p})^2}{2}-\dfrac{(e-a_{r_p})(b_{r_p}-a_{r_p})}{\pi_{r_p}+1}-\dfrac{(b_{r_p}-e)^{\pi_{r_p}+2}}{(b_{r_p}-a_{r_p})^{\pi_{r_p}}(\pi_{r_p}+1)(\pi_{r_p}+2)}+\dfrac{(b_{r_p}-a_{r_p})^2}{(\pi_{r_p}+1)(\pi_{r_p}+2)}, & \text{If } a_{r_p}<e\leq b_{r_p}\\[2ex] 0 & \text{Otherwise}\end{cases} \qquad (7)$$

Liquidity

Liquidity is one of the most important aspects that concern decision-makers in portfolio selection. Liquidity is defined as the probability of converting an investment into cash without any significant loss in value (Arenas-Parra et al., 2001; Gupta, Mittal, et al., 2013). Generally, investors prefer portfolios which can be liquidated at higher expected values as well as portfolios for which liquidation values are more certain. In this study, the liquidity of an asset is defined by the stock liquidity indicator:

$$\text{Liquidity}=\frac{\text{DOT}}{\text{TDP}}\left(\sqrt{\left(\frac{\text{NST}}{\text{TAS}}\right)\left(\frac{\text{TSV}}{\text{TAV}}\right)}\right) \qquad (8)$$

where DOT is the number of days within the observed period in which the stock was at least traded once; TDP is the total number of days in the period; NST is the number of stock trades during the period; TAS is the total trades of all stocks during the period; TSV is the trading stock volume in USD in the period and TAV is the trading volume of all stocks in USD in the period.

Because of incomplete information, stock liquidity indicators are only vague estimates. This study assumes that the indicators of stock liquidity are fuzzy numbers. The parameters of the L-R power fuzzy numbers are obtained from the empirical percentiles of the historical liquidity data, as previously explained. The maximization of the expected liquidity of the portfolio can be expressed as:

$$\text{Max } F_3(\omega_i)=\sum_{i=1}^{n}\left[\left[\frac{1}{2}\left[b_{l_i}+c_{l_i}+\frac{(d_{l_i}-c_{l_i})\rho_{l_i}}{\rho_{l_i}+1}-\frac{(b_{l_i}-a_{l_i})\pi_{l_i}}{\pi_{l_i}+1}\right]\right]\omega_i\right] \qquad (9)$$

3.2 Constraints

Capital budget constraint on the assets is expressed as

$$\sum_{i=1}^{n} \omega_i = 1 \tag{10}$$

No short selling of assets is expressed as

$$\omega_i \geq 0, \quad i=1, 2, \ldots, n \tag{11}$$

Maximal fraction of the capital that can be invested in a single asset is expressed as

$$\omega_i \leq u_i y_i, \quad i=1, 2, \ldots, n \tag{12}$$

Minimal fraction of the capital that can be invested in a single asset is expressed as

$$\omega_i \geq l_i y_i, \quad i=1, 2, \ldots, n \tag{13}$$

Number of assets held in the portfolio is expressed as

$$\sum_{i=1}^{n} y_i = k, \tag{14}$$
$$y_i \in \{0,1\}, \quad i=1, 2, \ldots, n$$

3.3 The decision problem

The multiobjective credibilistic mean-semivariance-liquidity portfolio selection model is formulated as:

$$\text{Max } F_1(\omega_i)$$
$$\text{Min } F_2(\omega_i)$$
$$\text{Max } F_3(\omega_i)$$

$$\text{s.t.} \begin{cases} \sum_{i=1}^{n} \omega_i = 1, & i=1, 2, \ldots, n \\ \omega_i \geq 0, & i=1, 2, \ldots, n \\ \omega_i \leq u_i y_i, & i=1, 2, \ldots, n \\ \omega_i \geq l_i y_i, & i=1, 2, \ldots, n \\ \sum_{i=1}^{n} y_i = k \\ y_i \in \{0,1\}, & i=1, 2, \ldots, n \end{cases}$$

Following Vercher and Bermúdez (2013), an admissible portfolio P^e is said to be Pareto-efficient if there is no other admissible portfolio P^o such that $P^o_{F1(\omega_i)} \geq P^e_{F1(\omega_i)}$, $P^o_{F2(\omega_i)} \leq P^e_{F2(\omega_i)}$, and $P^o_{F3(\omega_i)} \geq P^e_{F3(\omega_i)}$, with at least one strict inequality. The set of Pareto-efficient portfolios defines the efficient frontier, which could be seen as a surface in the 3-D space of the three objectives F (F1, F2, F3).

4 Solution methodology

In the above paragraph, a multiobjective credibilistic portfolio selection model was formulated where their objective functions correspond to the crisp goals of return, risk and liquidity. Note that the calculation of expected return, downside risk and expected liquidity depends on both i) the characteristics of the L-R power fuzzy returns and the L-R power fuzzy liquidity of each asset, and ii) the average of the fuzzy numbers. Furthermore, the introduction of realistic constraints into the suggested model convert the problem from a classical quadratic optimization problem to a quadratic mixed-integer problem that is NP-hard. In order to overcome this drawback, multiobjective evolutionary algorithms (MOEAs) have been successfully applied for generating solutions of the constrained portfolio optimization problems.

The most commonly-used MOEA for solving the constrained portfolio optimization problem is the Non-dominated Sorting Genetic Algorithm II (NSGA-II) (Liagkouras & Metaxiotis, 2015), first introduced by Deb et al. (2002), which is the one applied in our study. The procedural steps of this algorithm are those described by Deb et al. (2002) and Palanikumar et al. (2009).

The experimental parameters' configuration for testing this algorithm are: population size (400), distribution index for crossover (10); probability of crossover (0.9); distribution index for mutation (50); probability of mutation (0.01); and the maximum number of generations (500). Fig. 1 shows the overall structure of the MCMSL modelling approach.

5 Experimental results

5.1. Data description

The Latin American Integrated Market is an integrated trading venture between the stock markets of Chile, Colombia, Mexico and Peru that began operating in May 30, 2011. MILA market allows, for example, Mexican investors to buy Chilean or Colombian securities without the need to open brokerage accounts in these two foreign stock markets. While the individual MILA markets are relatively small, their combination provides investors with a larger set of securities to choose. In this way, they can extend their possibilities of diversification and potentially improve the risk-return trade-off in their portfolios.

In order to illustrate the usefulness of the MCMSL model, this paper presents a real-world empirical study using for the first time a data set extracted from the MILA market. The data correspond to weekly closing adjusted prices and their indicators of stock liquidity, observed in t = 239 periods from June 03, 2011 until December 25, 2015. According to the World Federation of Exchanges (WFE) by the end of 2015 the number of listed companies in the MILA market were 804. The candidate stocks to be included in the investment portfolio must meet following two conditions during the study period: i) they have been traded every week; and ii) they have an average monthly trading volume higher than the average monthly trading volume presented on their own national stock market. Once these conditions are considered, only 29 assets, n=29 are available. The exchange codes of the 29 assets are PFDAVVNDA, PFBCOLOM, CORFICOLCF, ALFA, ALSEA, AC, ASUR, BIMBO, BOLSA, CEMEX, KOF, FEMSA, GCARSO, GENTERA, GFNORTE, GMEXICO, GAP, MASECA, KIMBER, LIVERPOOL, TLEVISA, AESGENER, AGUAS-A, CHILE, BCI, ITAUCORP, CCU, ENELCHILE and SM-

CHILE B. For convenience in the description of the notation, we label these 29 assets successively as A1, A2,…, A29.

5.2. Results

Returns of assets rit are obtained as $r_{it} = (p_{it} - p_{it-1})/(p_{it-1})$, i = 1, 2, …, 29; t = 1, 2, …, 239, where pit is the closing price of the i-th asset on Friday of week t. Then, the membership function of the L-R fuzzy return (ξ_{r_i}) and the liquidity (ξ_{l_i}) are obtained from the empirical percentiles of their historical returns and indicators of stock liquidity, respectively, as was explained in Section 3.
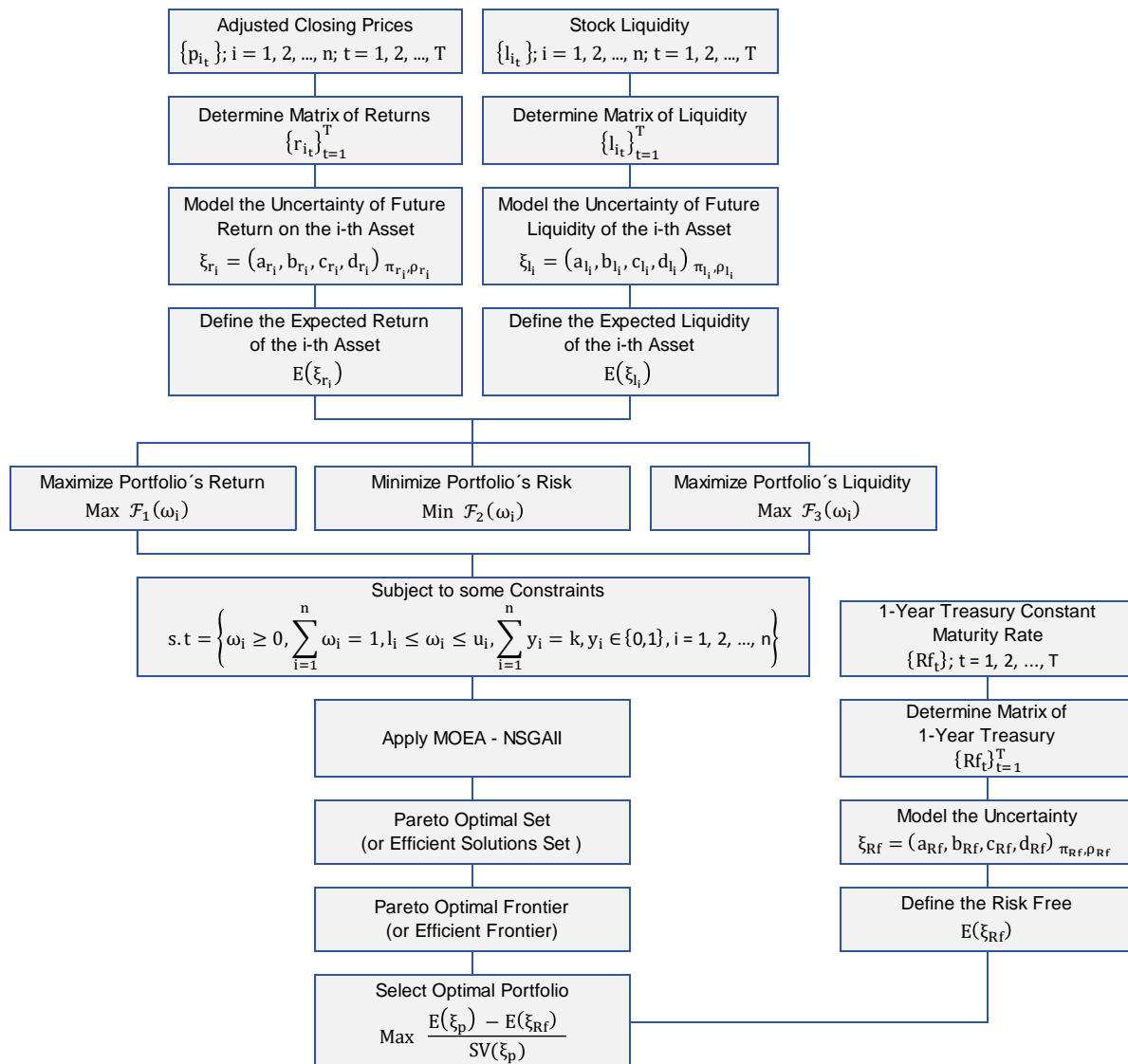

Figure 1. Overall structure of the MCMSL modelling approach.

Tables 1 and 2 show the fuzzy data regarding return and liquidity for the 29 selected assets, and their crisp credibilistic mean values. When the parameters of the membership function of each L-R fuzzy return are analyzed, it is noted that the left and right spreads are different, i.e., (b-a) ≠ (d-c). This evidence confirms the existence of asymmetry in the 29 fuzzy returns and, therefore, the choice of the semivariance was the most appropriate decision.

Table 1. L-R Fuzzy return of the assets and their crisp credibilistic mean values.

Asset	Return $\xi_{r_i} = (a_{r_i}, b_{r_i}, c_{r_i}, d_{r_i})_{\pi_{r_i}, \rho_{r_i}}$	Crisp Credibilistic Mean Values
A1	$(-0.06563, -0.00409, 0.00547, 0.06565)L_{0.52243}R_{0.44550}$	-0.000597
A2	$(-0.08206, -0.00327, 0.00455, 0.06183)L_{0.44442}R_{0.48893}$	-0.002076
A3	$(-0.05837, -0.00013, 0.00472, 0.05250)L_{0.56591}R_{0.0.45974}$	-0.000703
A4	$(-0.07862, -0.00397, 0.00434, 0.09799)L_{0.62926}R_{0.46993}$	0.000740
A5	$(-0.07891, 0.00167, 0.01302, 0.09301)L_{0.48751}R_{0.50776}$	0.007611
A6	$(-0.06550, -0.00409, 0.00241, 0.07315)L_{0.49951}R_{0.57142}$	0.001791
A7	$(-0.06155, 0.00249, 0.00907, 0.07653)L_{0.66725}R_{0.51298}$	0.004403
A8	$(-0.07114, -0.00197, 0.00579, 0.08474)L_{0.54195}R_{0.52523}$	0.003348
A9	$(-0.08642, -0.00355, 0.00646, 0.08604)L_{0.53855}R_{0.43870}$	-0.000917
A10	$(-0.11207, -0.00194, 0.00629, 0.10866)L_{0.52320}R_{0.52155}$	0.000806
A11	$(-0.07077, -0.00355, 0.00648, 0.06321)L_{0.47566}R_{0.63197}$	0.001613
A12	$(-0.06426, 0.00018, 0.00717, 0.06823)L_{0.63239}R_{0.50229}$	0.001401
A13	$(-0.08142, -0.00105, 0.00605, 0.08889)L_{0.50132}R_{0.49297}$	0.002760
A14	$(-0.09610, -0.00336, 0.00596, 0.08619)L_{0.45964}R_{0.63966}$	0.002348
A15	$(-0.08624, -0.00779, 0.00423, 0.09266)L_{0.46855}R_{0.58885}$	0.002094
A16	$(-0.08441, -0.00368, 0.00737, 0.08382)L_{0.64722}R_{0.49659}$	-0.001333
A17	$(-0.05605, -0.00181, 0.00663, 0.08016)L_{0.61356}R_{0.53535}$	0.004919
A18	$(-0.06769, 0.00158, 0.01217, 0.08745)L_{0.53070}R_{0.57264}$	0.008572
A19	$(-0.07189, -0.00102, 0.00697, 0.07995)L_{0.65163}R_{0.55270}$	0.001981
A20	$(-0.05932, -0.00004, 0.00711, 0.07472)L_{0.59170}R_{0.43567}$	0.002775
A21	$(-0.07145, -0.00108, 0.00768, 0.06401)L_{0.52438}R_{0.57310}$	0.001456
A22	$(-0.05726, -0.00447, 0.00306, 0.06548)L_{0.55931}R_{0.54310}$	0.000812
A23	$(-0.04633, -0.00194, 0.00276, 0.05853)L_{0.53680}R_{0.49413}$	0.001879
A24	$(-0.04980, -0.00233, 0.00206, 0.04733)L_{0.50957}R_{0.57071}$	0.000077
A25	$(-0.06457, -0.00668, 0.00129, 0.08281)L_{0.59895}R_{0.49487}$	-0.000042
A26	$(-0.07181, -0.00689, 0.00091, 0.08026)L_{0.44879}R_{0.46717}$	-0.000413
A27	$(-0.06371, -0.00334, 0.00265, 0.07772)L_{0.59105}R_{0.46957}$	0.000436
A28	$(-0.06730, -0.00372, 0.00396, 0.06537)L_{0.49137}R_{0.47871}$	-0.000411
A29	$(-0.05243, -0.00304, 0.00226, 0.05724)L_{0.56215}R_{0.48733}$	-0.000270

Table 2. L-R Fuzzy liquidity of the assets and their crisp credibilistic mean values.

Asset	Liquidity $\xi_{l_i}=\left(a_{l_i}, b_{l_i}, c_{l_i}, d_{l_i}\right)_{\pi_{l_i}, \rho_{l_i}}$	Crisp Credibilistic Mean Values
A1	$(0.01291, 0.02715, 0.02912, 0.06874)L_{0.62085}R_{0.36660}$	0.030722
A2	$(0.04013, 0.08476, 0.09240, 0.19457)L_{0.91198}R_{0.41446}$	0.092907
A3	$(0.00751, 0.01740, 0.01861, 0.03363)L_{0.77838}R_{0.54319}$	0.018482
A4	$(0.01364, 0.03709, 0.04012, 0.06481)L_{0.78597}R_{0.48410}$	0.037472
A5	$(0.00168, 0.01045, 0.01238, 0.02947)L_{1.35871}R_{0.48594}$	0.011686
A6	$(0.00710, 0.01581, 0.01708, 0.02538)L_{0.73018}R_{0.75733}$	0.016395
A7	$(0.00323, 0.01000, 0.01119, 0.02628)L_{0.87060}R_{0.46760}$	0.011421
A8	$(0.00944, 0.01572, 0.01665, 0.02559)L_{0.71114}R_{0.47475}$	0.016319
A9	$(0.00465, 0.00879, 0.00976, 0.01652)L_{0.84905}R_{0.52747}$	0.009491
A10	$(0.03596, 0.05853, 0.06173, 0.09610)L_{0.88493}R_{0.49827}$	0.060546
A11	$(0.00363, 0.01463, 0.01568, 0.02662)L_{0.62527}R_{0.40619}$	0.014618
A12	$(0.02007, 0.03671, 0.03954, 0.05317)L_{0.56785}R_{0.50087}$	0.037388
A13	$(0.00224, 0.00619, 0.00671, 0.01224)L_{0.64051}R_{0.48743}$	0.006586
A14	$(0.00652, 0.01603, 0.01780, 0.02964)L_{0.63278}R_{0.57994}$	0.017247
A15	$(0.02632, 0.05827, 0.06189, 0.09972)L_{0.75832}R_{0.52887}$	0.059734
A16	$(0.03861, 0.05606, 0.05886, 0.08984)L_{0.59576}R_{0.45777}$	0.059066
A17	$(0.00445, 0.01091, 0.01264, 0.02696)L_{0.69365}R_{0.51466}$	0.012885
A18	$(0.00340, 0.01333, 0.01706, 0.03893)L_{1.58962}R_{0.69049}$	0.016613
A19	$(0.00824, 0.02193, 0.02388, 0.03615)L_{1.20490}R_{0.65311}$	0.021585
A20	$(0.00300, 0.00812, 0.00882, 0.01954)L_{1.01010}R_{0.37608}$	0.008648
A21	$(0.02128, 0.03348, 0.03586, 0.05167)L_{0.65427}R_{0.60188}$	0.035228
A22	$(0.00966, 0.01667, 0.01828, 0.03466)L_{0.79394}R_{0.41382}$	0.018320
A23	$(0.01073, 0.02375, 0.02689, 0.04934)L_{0.72299}R_{0.54948}$	0.026568
A24	$(0.02168, 0.03806, 0.04311, 0.09364)L_{0.85247}R_{0.42108}$	0.044302
A25	$(0.00920, 0.01720, 0.01900, 0.03361)L_{0.71870}R_{0.52764}$	0.018951
A26	$(0.00914, 0.02256, 0.02687, 0.06516)L_{0.91444}R_{0.53595}$	0.028187
A27	$(0.00875, 0.01817, 0.02043, 0.04436)L_{0.53978}R_{0.40792}$	0.021116
A28	$(0.02641, 0.05480, 0.06132, 0.10541)L_{0.66403}R_{0.51610}$	0.059899
A29	$(0.00408, 0.00770, 0.00881, 0.02005)L_{0.96621}R_{0.44606}$	0.009100

Let us assume that the diversification parameters are given by $l_i= 0$ and $u_i= 0.3$ for every $i = 1,2, …, 29$. Following Gupta et al. (2014), it is not advisable to have very few or very large number of assets in the portfolio so as to achieve diversification. According to these authors, portfolio diversification by investors lies in the narrow range of 3-10 assets. Thus, following this recommendation, this study considers to set $k = 10$ assets for an admissible portfolio.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Fig. 2 shows a 3-dimensional plot of the final populations generated by NSGA-II for the MCMSL model. The group of points represents the set of non-dominated solutions (or efficient portfolios) for which none of the three objectives (return-risk-liquidity) can be improved without deteriorating another objective. NSGA-II supplies sets of efficient portfolios distributed over the Pareto optimal front, which provide investors with a true picture of trade-offs. Furthermore, each pair of functions has been plotted in bi-dimensional images in Fig. 3. It can be observed that bi-objective coverages of these Pareto optimal fronts present a suitable performance.
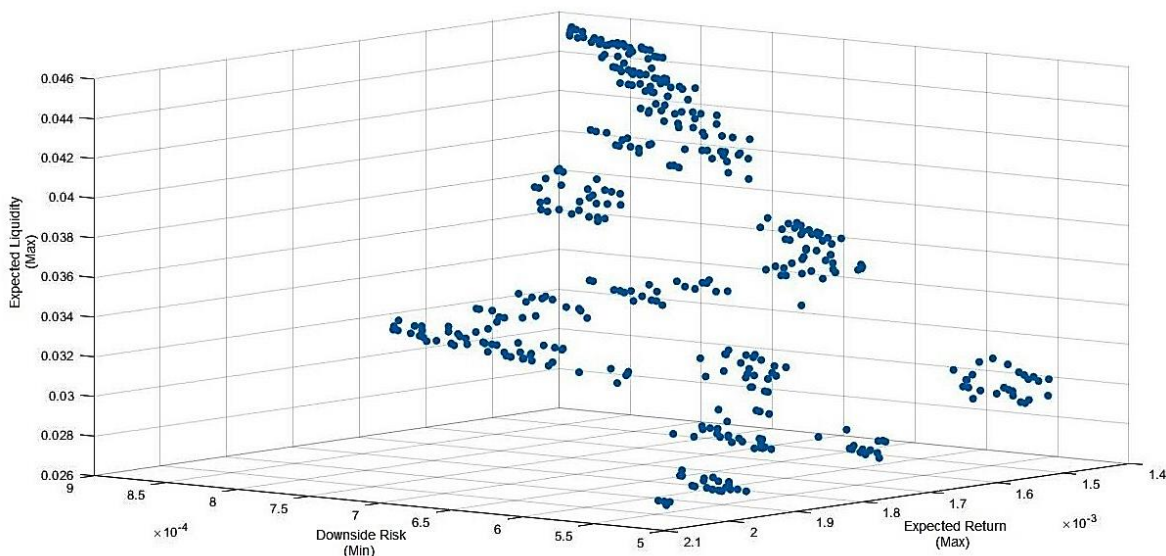

Figure 2. Pareto optimal front of the MCMSL model

Additionally, it is worthy to analyze the influence of the inclusion of liquidity as an additional portfolio selection criterion. Figure 3a shows that portfolios with the highest liquidity have the highest risk and the lowest return. Furthermore, high-return portfolios have medium and low risk but are rather illiquid. This outcome is confirmed by Fig. 3b and 3c. As expected, it is not possible for any portfolio to score well in all three criteria. There is no portfolio that dominates the rest in terms of achieving high return, low risk and at the same time being very liquid. For that reason, the most liquid portfolios are riskier and less profitable than their peers, while the most illiquid portfolios, in turn, are less risky and more profitable.

In order to analyze the relationship between the three criteria (return, risk and liquidity), Spearman's rank partial correlation coefficient is applied. Doing this, the coherence of the relationship between return and risk can be checked, removing the influence of liquidity on both variables. We expect both variables to have a positive correlation, but the previous graphical analysis of Fig. 3a-c does not provide a clear answer. Furthermore, thanks to Spearman's rank partial correlation coefficient we can get to know the relationship of both variables with liquidity. As presented in Table 3, there is a positive correlation between return and risk, meaning that more profitable portfolios are riskier. Regarding liquidity, more liquid portfolios are risker, but less profitable. Conversely, less liquid portfolios are less risky and more profitable.
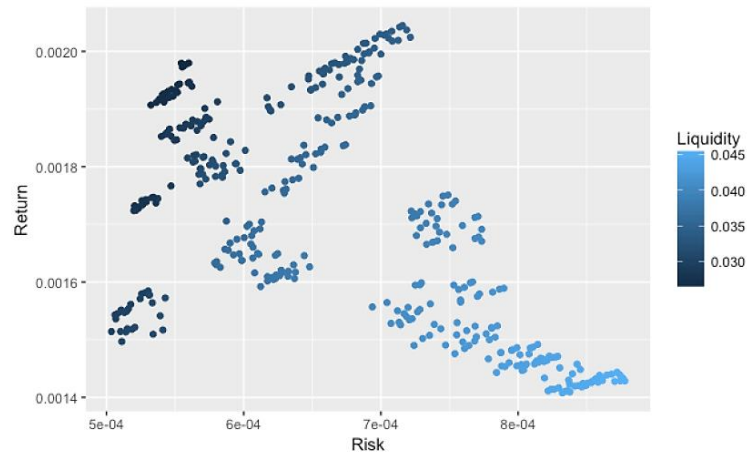
(a) Downside Risk vs. Expected Return
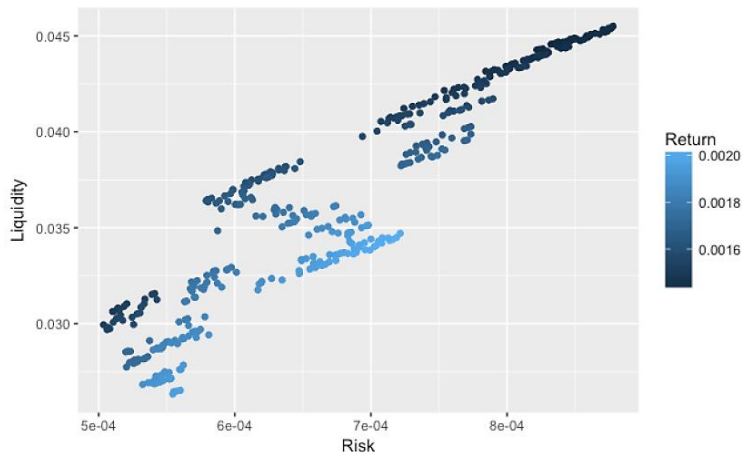
(b) Expected Liquidity vs. Expected Return
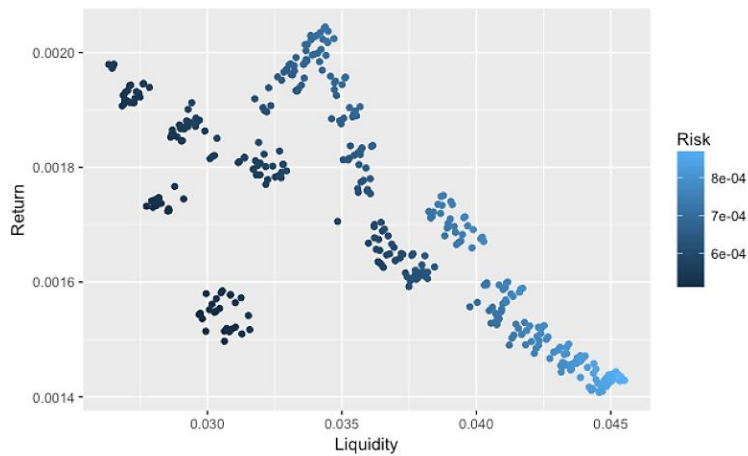

(c) Downside Risk vs. Expected Liquidity
Figure 3. Values of the three corresponding objective functions for all the solutions generatedby NSGA-II

Table 3. Spearman's rank partial correlation matrix

	Return	Risk	Liquidity
Return	1.000		
Risk	0.660**	1.000	
Liquidity	-0.811**	0.940**	1.000

Note: ** Correlation is significant at the 0.01 level

This relationship between liquidity and risk can be explained by the fact that more liquid assets are traded more often and therefore are subject to more volatility, increasing their risk. Regarding the liquidity-return correlation, the result suggests that companies which are traded more often are not so profitable than those with less trades.

This paper has proposed a multiobjective approach to portfolio optimization considering return, risk and liquidity. In any given real-world investment scenario, an investor needs to pick a portfolio along the Pareto optimal front Fig. 3 that meets his/her preferences. In order to select the optimal portfolio, this study uses the Sortino ratio, which gauges the risk-adjusted return of an investment asset or portfolio. The Sortino ratio in a credibilistic environment is computed as:

$$\text{Sortino Ratio}=\frac{E\left(\xi_p\right) - E\left(\xi_{Rf}\right)}{SV(\xi_p)} \tag{15}$$

where, $E(\xi_p)$ is the expected fuzzy return of the portfolio, $SV(\xi_p)$ is the fuzzy semivariance, and $E(\xi_{Rf})$ is the target or required rate of return, that is, the US 1-Year Treasury Constant Maturity Rate.

Table 4. ETF versus optimal portfolio selected

	VaR	Return	Liquidity
ETF MILA TRC	0.2920	0.0488	0.0167
Optimal Portfolio	0.2150	0.0651	0.0327

Finally, it is convenient to compare the performance of the optimal portfolio resulting from the MCMSL model proposed with the performance of a similar investment alternative in the market. Table 4 compares the optimal portfolio selected using the proposed Sortino ratio with its benchmark, the ETF MILA TRC, which tracks the MILA market. Table 4 shows that the selected portfolio beats the benchmark regarding the three selected criteria, return, risk and liquidity. Thereupon, it is confirmed that the applied multiobjective portfolio selection model offers promising results for investors seeking additional goals beyond the return-risk optimization.

6. Conclusions

This paper extends the stochastic mean-semivariance model to a credibilistic multiobjective model in which return, risk and liquidity are employed to measure portfolio performance. In order to quantify the uncertainty of the future returns and the liquidity of each risky asset, this study proposes to use L-R power fuzzy numbers, where its membership function is build using the sample percentiles of the historical data set of the returns and liquidity, respectively. Non-dominated Sorting Genetic Algorithm II (NSGA-II) is applied to select efficient portfolios in the fuzzy return-risk-liquidity trade-off in the presence of cardinality constraint and upper and lower bound constraints. To illustrate the usefulness of the proposed model and the solution approach for the multiobjective

portfolio selection, this paper presents a real-world empirical study using a data set extracted from the Latin American Integrated Market MILA. The computational results of the numerical experiments establish that the proposed MCMSL model supplies sets of efficient portfolios uniformly distributed over the Pareto optimal front, which provide the investor a true picture of trade-offs. Additionally, by maximizing the Sortino ratio for the first time in a credibilistic environment, this study selects the optimum investment weights in a portfolio, and analyzes its performance in relation to another alternative investment during a period of one year.

Based on the fuzzy set theory, this research developed a novel approach by employing a distinctive return-semivariance-liquidity measure to gauge the portfolio performance in Latin American emerging financial markets. In view of the above discussions, this study concludes that the proposed model provides decision-makers with an effective and practicable alternative to solve the portfolio selection problem.

References

Arenas-Parra, M., Bilbao-Terol, A., & Rodríguez-Uría, M. V. (2001). A fuzzy goal programming approach to portfolio selection. *European Journal of Operational Research*, 133(2), 287–297. https://doi.org/10.1016/S0377-2217(00)00298-8

Arribas, I., García, F., Guijarro, F., Oliver, J., & Tamošiūnienė, R. (2016). Mass appraisal of residential real estate using multilevel modelling. *International Journal of Strategic Property Management*, 20(1), 77–87. https://doi.org/10.3846/1648715X.2015.1134702

Aznar, J., & Guijarro, F. (2016). Housing valuation in Spain. Homogenization method and alternative methodologies. *Finance, Markets and Valuation*, 2(1), 91–125.

Bawa, V. S. (1975). Optimal rules for ordering uncertain prospects. *Journal of Financial Economics*, 2(1), 95–121. https://doi.org/10.1016/0304-405X(75)90025-2

Bermúdez, J. D., Segura, J. V., & Vercher, E. (2012). A multi-objective genetic algorithm for cardinality constrained fuzzy portfolio selection. *Fuzzy Sets and Systems*, 188(1), 16–26. https://doi.org/10.1016/j.fss.2011.05.013

Carlsson, C., Fullér, R., & Majlender, P. (2002). A possibilistic approach to selecting portfolios with highest utility score. *Fuzzy Sets and Systems*, 131(1), 13–21. https://doi.org/10.1016/S0165-0114(01)00251-2

Čižo, E., Lavrinenko, O., Ignatjeva, S. (2020). Analysis of the relationship between financial development and economic growth in the EU countries. *Insights into Regional Development*, 2(3), 645-660. https://doi.org/10.9770/IRD.2020.2.3(3)

Deb, K., Agrawal, K., Pratap, A., & Meyarivan, T. (2002). A Fast Elitist Non-dominated Sorting Genetic Algorithm for Multi-objective Optimization: NSGA-II. *IEEE Transactions on Evolutionary Computation*, 6(2), 182–197. https://doi.org/10.1109/4235.996017

Dubois, D. J., & Prade, H. (1980). *Fuzzy sets and systems: theory and applications* (Vol 144). Academic Press.

Fishburn, P. C. (1977). Mean-Risk Analysis with Risk Associated with Below-Target Returns. *The American Economic Review*, 67(2), 116–126. https://doi.org/10.2307/1807225

García, F., González-Bueno, J., & Oliver, J. (2015). Mean-variance investment strategy applied in emerging financial markets: Evidence from the Colombian stock market. *Intellectual Economics*, 9(1), 22–29. https://doi.org/10.1016/J.INTELE.2015.09.003

García, F., González-Bueno, J., Oliver, J., & Riley, N. (2019). Selecting Socially Responsible Portfolios: A Fuzzy Multicriteria Approach. *Sustainability*, 11(9, 2496). https://doi.org/10.3390/su11092496

García, F., González-Bueno, J., Oliver, J., & Tamošiūnienė, R. (2019). A credibilistic mean-semivariance-PER portfolio selection model for Latin America. *Journal of Business Economics and Management*, 20(2), 225–243. https://doi.org/10.3846/jbem.2019.8317

García, F., Guijarro, F., & Moya, I. (2013). A multiobjective model for passive portfolio management: an application on the S&P 100 index. *Journal of Business Economics and Management*, 14(4), 758–775. https://doi.org/10.3846/16111699.2012.668859

García, F., Guijarro, F., Oliver, J., & Tamošiūnienė, R. (2018). Hybrid fuzzy neural network to predict price direction in the german DAX-30 index. *Technological and Economic Development of Economy*, 24(6), 2161–2178. https://doi.org/10.3846/tede.2018.6394

González-Bueno, J. (2019). *Optimización multiobjetivo para la selección de carteras a la luz de la teoría de la credibilidad. Una aplicación en el mercado integrado latinoamericano*. Editorial Universidad Pontificia Bolivariana.

Guijarro, F. (2015). Multicriteria ranking of the Spanish digital press. *Finance, Markets and Valuation*, 1(1), 51–65.

Gupta, P., Inuiguchi, M., & Mehlawat, M. K. (2011). A hybrid approach for constructing suitable and optimal portfolios. *Expert Systems with Applications*, 38(5), 5620–5632. https://doi.org/10.1016/j.eswa.2010.10.073

Gupta, P., Inuiguchi, M., Mehlawat, M. K., & Mittal, G. (2013). Multiobjective credibilistic portfolio selection model with fuzzy chance-constraints. *Information Sciences*, 229, 1–17. https://doi.org/10.1016/j.ins.2012.12.011

Gupta, P., Mehlawat, M. K., Inuiguchi, M., & Chandra, S. (2014). Portfolio Optimization with Interval Coefficients. In Fuzzy Portfolio Optimization. *Studies in Fuzziness and Soft Computing* (Vol 316, pp. 33–59). Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-54652-5_2

Gupta, P., Mehlawat, M. K., & Saxena, A. (2008). Asset portfolio optimization using fuzzy mathematical programming. *Information Sciences*, 178(6), 1734–1755. https://doi.org/10.1016/j.ins.2007.10.025

Gupta, P., Mehlawat, M. K., & Saxena, A. (2010). A hybrid approach to asset allocation with simultaneous consideration of suitability and optimality. *Information Sciences*, 180(11), 2264–2285. https://doi.org/10.1016/J.INS.2010.02.007

Gupta, P., Mittal, G., & Mehlawat, M. K. (2013). Expected value multiobjective portfolio rebalancing model with fuzzy parameters. Insurance: *Mathematics and Economics*, 52(2), 190–203. https://doi.org/10.1016/j.insmatheco.2012.12.002

Huang, X. (2006a). Fuzzy chance-constrained portfolio selection. *Applied Mathematics and Computation*, 177(2), 500–507. https://doi.org/10.1016/j.amc.2005.11.027

Huang, X. (2008). Mean-semivariance models for fuzzy portfolio selection. *Journal of Computational and Applied Mathematics*, 217(1), 1–8. https://doi.org/10.1016/j.cam.2007.06.009

Huang, X. (2009). A review of credibilistic portfolio selection. *Fuzzy Optimization and Decision Making*, 8(3), 263–281. https://doi.org/10.1007/s10700-009-9064-3

Huang, X. (2010). *Portfolio Analysis, From Probabilistic to Credibilistic and Uncertain Approaches* (Vol. 250). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-11214-0

Huang, X. (2006b). Credibility based fuzzy portfolio selection. *IEEE International Conference on Fuzzy Systems*, 159–163. https://doi.org/10.1109/FUZZY.2006.1681709

J.P.Morgan. (1996). *Riskmetrics technical document* (4th ed.). Morgan Guaranty Trust Company of New York.

Jalota, H., Thakur, M., & Mittal, G. (2017a). Modelling and constructing membership function for uncertain portfolio parameters: A credibilistic framework. *Expert Systems with Applications*, 71, 40–56. https://doi.org/10.1016/j.eswa.2016.11.014

Jalota, H., Thakur, M., & Mittal, G. (2017b). A credibilistic decision support system for portfolio optimization. *Applied Soft Computing*, 59, 512–528. https://doi.org/10.1016/j.asoc.2017.05.054

Li, X., & Qin, Z. (2014). Interval portfolio selection models within the framework of uncertainty theory. *Economic Modelling*, 41, 338–344. https://doi.org/10.1016/j.econmod.2014.05.036

Liagkouras, K., & Metaxiotis, K. (2015). Efficient Portfolio Construction with the Use of Multiobjective Evolutionary Algorithms: Best Practices and Performance Metrics. *International Journal of Information Technology & Decision Making*, 14(03), 535–564. https://doi.org/10.1142/S0219622015300013

Liu, B. (2004). *Uncertainty theory: an introduction to its axiomatic foundations* (Vol 154). Springer-Verlag Berlin Heidelberg.

Liu, B. (2007). *Uncertainty Theory an Introduction to its Axiomatic Foundations* (2nd ed.). Springer-Verlag Berlin Heidelberg.

Liu, B., & Liu, Y. K. (2002). Expected value of fuzzy variable and fuzzy expected value models. *IEEE Transactions on Fuzzy Systems*, 10(4), 445–450. https://doi.org/10.1109/TFUZZ.2002.800692

Liu, J., Jin, X., Wang, T., & Yuan, Y. (2015). Robust multi-period portfolio model based on prospect theory and ALMV-PSO algorithm. *Expert Systems with Applications*, 42(20), 7252–7262. https://doi.org/10.1016/J.ESWA.2015.04.063

Markowitz, H. (1952). Portfolio Selection. *The Journal of Finance*, 7(1), 77–91. https://doi.org/10.1111/j.1540-6261.1952.tb01525.x

Markowitz, H. (1959). *Portfolio selection: efficient diversification of investments*. Jhon Wiley & Sons, Inc.

Markowitz, H., Todd, P., Xu, G., & Yamane, Y. (1993). Computation of mean-semivariance efficient sets by the Critical Line Algorithm. *Annals of Operations Research*, 45(1), 307–317. https://doi.org/10.1007/BF02282055

Masood, O., Tvaronavičienė, M., & Javaria, K. (2019). Impact of oil prices on stock return: evidence from G7 countries. *Insights into Regional Development,* 1(2), 129–137. https://doi.org/10.9770/ird.2019.1.2(4)

Mehlawat, M. K. (2016). Credibilistic mean-entropy models for multi-period portfolio selection with multi-choice aspiration levels. *Information Sciences*, 345, 9–26. https://doi.org/10.1016/j.ins.2016.01.042

Palanikumar, K., Latha, B., Senthilkumar, V. S., & Karthikeyan, R. (2009). Multiple performance optimization in machining of GFRP composites by a PCD tool using non-dominated sorting genetic algorithm (NSGA-II). *Metals and Materials International*, 15(2), 249–258. https://doi.org/10.1007/s12540-009-0249-7

Ren, F., Lu, Y.-N., Li, S.-P., Jiang, X.-F., Zhong, L.-X., & Qiu, T. (2017). Dynamic Portfolio Strategy Using Clustering Approach. *PLOS ONE*, 12(1), e0169299. https://doi.org/10.1371/journal.pone.0169299

Rockafellar, R. T., & Uryasev, S. (2000). Optimization of conditional value-at-risk. *Journal of Risk*, 2(3), 21–41.

Rockafellar, R. T., & Uryasev, S. (2002). Conditional value-at-risk for general loss distributions. *Journal of Banking & Finance*, 26(7), 1443–1471. https://doi.org/10.1016/S0378-4266(02)00271-6

Saborido, R., Ruiz, A. B., Bermúdez, J. D., Vercher, E., & Luque, M. (2016). Evolutionary multi-objective optimization algorithms for fuzzy portfolio selection. *Applied Soft Computing*, 39, 48–63. https://doi.org/10.1016/j.asoc.2015.11.005

Sortino, F. A., & Price, L. N. (1994). Performance Measurement in a Downside Risk Framework. *The Journal of Investing*, 3(3), 59–64. https://doi.org/10.3905/joi.3.3.59

Speranza, M. (1993). Linear programming models for portfolio optimization. *Finance*, 14, 107–123.

Vercher, E. (2008). Portfolios with fuzzy returns: Selection strategies based on semi-infinite programming. *Journal of Computational and Applied Mathematics*, 217(2), 381–393. https://doi.org/10.1016/j.cam.2007.02.017

Vercher, E., & Bermúdez, J. D. (2012). Fuzzy Portfolio Selection Models: A Numerical Study. In M. Doumpos, C. Zopounidis, & P. M. Pardalos (Eds.), *Financial Decision Making Using Computational Intelligence*. Springer Optimization and Its Applications (Volumen 70, pp. 253–280). Springer, Boston, MA. https://doi.org/10.1007/978-1-4614-3773-4_10

Vercher, E., & Bermúdez, J. D. (2013). A Possibilistic Mean-Downside Risk-Skewness Model for Efficient Portfolio Selection. *IEEE Transactions on Fuzzy Systems*, 21(3), 585–595. https://doi.org/10.1109/TFUZZ.2012.2227487

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Vercher, E., & Bermúdez, J. D. (2015). Portfolio optimization using a credibility mean-absolute semi-deviation model. *Expert Systems with Applications*, 42(20), 7121–7131. https://doi.org/10.1016/j.eswa.2015.05.020

Vercher, E., Bermúdez, J. D., & Segura, J. V. (2007). Fuzzy portfolio optimization under downside risk measures. *Fuzzy Sets and Systems*, 158(7), 769–782. https://doi.org/10.1016/j.fss.2006.10.026

Wang, S., & Zhu, S. (2002). On Fuzzy Portfolio Selection Problems. *Fuzzy Optimization and Decision Making*, 1(4), 361–377. https://doi.org/10.1023/A:1020907229361

Zadeh, L. A. (1965). Fuzzy sets. *Information and Control*, 8(3), 338–353. https://doi.org/10.1016/S0019-9958(65)90241-X

Fernando GARCÍA received the B.S. degree from the Hochschule Bremen, in Germany in 1998, the M.S. degree in Business Administration from the Universitat de València, Valencia, Spain, in 1999, and the Ph.D. degree from the Universitat Politecnica de Valencia in 2005. He is associate professor of finance in the Business School of Universitat Politècnica de València. His research interests include investment strategies, multicriteria decision making, corporate responsibility and asset valuation. He has published more than 30 papers in indexed Journals such as Technological and Economic Development of Economy, Mathematical and Computer Modelling, Journal of the Operational Research Society, Journal of Business Economics and Management, Sustainability, Computers and Operations Research, Journal of Environmental Management, Neural Computing and Applications, among others. He is an Associate Editor of the journals Entrepreneurship and Sustainability Issues; Finance, Markets and Valuation; and Insights into Regional Development.
ORCID ID: https://orcid.org/0000-0001-6364-520X

Jairo. GONZÁLEZ-BUENO received the B.S. degree in financial engineering from the Universidad Autónoma de Bucaramanga, Colombia, in 2004, the M.S. degree in business administration from Universidad Industrial de Santander, Colombia, in 2012, and the Ph.D. in business management and administration from Universitat Politècnica de València, Spain, in 2018. He is currently an associate professor of finance with the faculty of business administration, Universidad Pontificia Bolivariana, Colombia. His current research interests include portfolio management, finance ethics and valuation. His research has been published in Journal of Business Economics and Management, Sustainability, and Journal Finance, Markets and Valuation, among others.
ORCID ID: https://orcid.org/0000-0002-5896-094X

Francisco GUIJARRO received the B.S. degree in computer science from Universitat Politècnica de València, Valencia, Spain, in 1998, the Ph.D. degree from the same University in 2003, and the M.S. degree in Statistics from Universitat de València, Valencia, Spain, in 2007. He is professor of finance in the Business School of Universitat Politècnica de València. His research interests include portfolio management, trading strategies and multicriteria decision models. He has published more than 30 papers in indexed Journals such as Expert Systems with Applications, European Journal of Operational Research, Journal of the Operational Research Society, Annals of Operations Research, Sustainability, Computers and Operations Research, International Transactions in Operational Research, among others. He has also served as editor in different Special Issues.
ORCID ID: https://orcid.org/0000-0002-8803-5165

Javier OLIVER was born in Valencia, Spain in 1973. He received the Bachelor degree in Business Administration from the Universitat de València in 1996, Master degree in Finance from Universitat Politècnica de València in 2010 and the Ph.D. degree in Business Administration from the Universitat Politècnica de València in 2014. Since 2011 to the present, he is an Associate Lecturer on the Economics Analysis Department in the Universitat de València. As well, since 2013 to the present he serves as Associate Lecturer in the Economics and Social Sciences Department of the Universitat Politècnica de València. He has co-authored several articles in the financial area.
ORCID ID: https://orcid.org/0000-0001-5317-6489

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Register for an ORCID ID:
https://orcid.org/register

DO ENVIRONMENTAL AND FINANCIAL PERFORMANCES AFFECT ENVIRONMENTAL DISCLOSURES? EVIDENCE FROM LISTED COMPANIES IN INDONESIA

Indah Fajarini Sri Wahyuningrum [1], Mochamad Arief Budihardjo [2], Fadel Iqbal Muhammad [3], Hadrian Geri Djajadikerta [4], Terri Trireksani [5]

[1] *Accounting Department, Universitas Negeri Semarang, Indonesia, Kampus Sekaran UNNES, Gunungpati, Semarang, Jawa Tengah, Indonesia*
[2] *Department of Environmental Engineering, Universitas Diponegoro, Jl. Prof. Sudarto SH, Tembalang, Semarang, Jawa Tengah, Indonesia*
[3] *MSc Environmental Sciences, Wageningen University & Research, Wageningen 6708PB, The Netherlands*
[4] *School of Business and Law, Edith Cowan University, 270 Joondalup Drive, Joondalup WA 6027, Australia*
[5] *Murdoch Business School, Murdoch University, 90 South Street, Murdoch WA 6150, Australia*

E-mails: [1]i.fajarini@mail.unnes.ac.id (Corresponding author); [2]m.budihardjo@ft.undip.ac.id; [3]fadel.muhammad@wur.ni; [4]h.djajadikerta@ecu.edu.au; [5]T.Trireksani@murdoch.edu.au

Abstract. The number of companies in Indonesia that have participated in environmental-related activities continues to grow. Some of these companies have also engaged and implemented an assessment program called Program for Pollution Control, Evaluation, and Rating (PROPER). This assessment program was initially launched by the Indonesian Ministry of Environment in 1995 to measure and rate the environmental performance of companies in Indonesia. They have also administered an environmental management system as part of their environmental protection initiatives. However, the level of environmental disclosure by these companies is still low. This may occur due to the current situation in which the companies are not obliged to incorporate environmental disclosures on their annual reports. For those companies that disclose their environmental performance, there is also no apparent reason on why they have done that. This research aims to examine the effect of environmental performance, company financial performance, and company characteristics on environmental disclosure. The population used in this research comprised of all registered non-financial companies in the Indonesia Stock Exchange in 2014–2016. The sample was selected using a purposive sampling method to obtain 36 sample companies and analyzed through multiple regression analysis. Results show that the environmental performance variable, which is described by PROPER ratings and environmental management systems, and company size variable, both affect the extent of environmental disclosures. However, the financial performance variable, which is described by companies' profitability and leverage, and the number of board commissioners variable, both do not significantly affect the extent of environmental disclosures.

Keywords: environmental disclosure; environmental performance; financial performance; company characteristics; PROPER; Indonesia; listed companies

Reference to this paper should be made as follows: Wahyuningrum, I.F.S., Budihardjo, M.A, Muhammad, F.I, Djajadikerta, H.G., Trireksani, T. 2020. Do environmental and financial performances affect environmental disclosures? Evidence from listed companies in Indonesia. *Entrepreneurship and Sustainability Issues*, 8(2), 1047-1061. http://doi.org/10.9770/jesi.2020.8.2(63)

JEL Classifications: Q56, M14, E16

1. Introduction

Climate change and global warming are issues that have been widely explored. Surrounded by these issues, companies are obliged to participate in exploring and protecting the environment because the environment is the facilitator of a business organization (Sen, Mukherjee & Pattanyak, 2011). One of the efforts that can be made by companies around the world as a form of attention and commitment to protecting the environment is conducting environmental disclosures. Corporate environmental disclosure is a process of communicating information related to environmental activities, which are commonly done through various types of media, such as annual reports, stand-alone sustainability reports, or company websites (Bhatia & Makkar, 2019; Djajadikerta and Trireksani, 2012; Inekwe, Hashim & Yahya, 2020; Ismail, Rahman & Hezabr, 2018; Lu & Taylor, 2016; Ong & Djajadikerta, 2018; Sharma, 2019; Zhang, Djajadikerta & Zhang, 2018).

In relation to sustainability reporting standards, nonprofit organizations that echo the importance of environmental sustainability have formed an initiative called the global reporting initiative (GRI). GRI was first established by the Coalition for Environmentally Responsible Economies in Boston, United States, in 1997. This organization initially established standard guidelines for sustainability reporting with six items of disclosure indicators: economy, environment, employment practices and work convenience, human rights, society, and responsibility for products. It has since made several revisions and developed more comprehensive guidelines (Bidari & Djajadikerta, 2020).

Environmental performance affects the extent to which environmental disclosure and its impact will become a company risk (Cormier and Magnan, 1999). According to Cho and Patten (2007), companies can gain legitimacy by providing their environmental disclosure. Additionally, participating in external environmental performance assessments is another way for companies to gain legitimacy. The premise is that companies with an adequate level of environmental performance have more opportunity and may have a tendency to provide a higher level of environmental disclosure. However, many prior studies have revealed inconsistent results of the relationship between environmental performance and environmental disclosure (Ong, Trireksani & Djajadikerta, 2016). Some studies found a positive correlation between environmental performance and environmental disclosure (e.g., Plumlee et al., 2015; Purwantini et al., 2019), while some others showed a negative correlation (e.g., Patten, 2002).

Former studies also point out numerous outcomes on the relationship between company financial performance and the extent of environmental disclosure. Some results indicated a positive or negative correlation, and some of them initiate no correlation (Elijido-Ten, 2007; Lima Crisóstomo, de Souza Freire & Cortes de Vasconcellos, 2011). Many researchers investigated the correlation between company characteristics (such as type of industry, firm size, company age, etc.) and environmental discussion, and most of the results found that they are significantly related (Branco & Rodrigues, 2008). Larger companies tend to be more provide comprehensive information about their environmental activities and more visible to external audiences and their stakeholders (Liu & Anbumozhi, 2009). It can be said large companies may increase their reputation by communicating their environmental disclosure to the public (Branco & Rodrigues, 2008).

Currently, there are no regulations requiring Indonesian companies to disclose their environmental activities or performance (Devie et al., 2019). Some studies show that the environmental disclosure practice conducted by Indonesian companies is still relatively low. A study by Trireksani and Djajadikerta (2016), for example, indicates that the extent of environmental disclosures made by the listed mining companies in Indonesia was merely moderate. Another study by the Center for Governance, Institutions, and Organizations of the National University

of Singapore Business School, using the GRI index, revealed that the quality of CSR implementation, which includes environmental disclosure, by Indonesian companies, was relatively lower than those of most of the other Southeast Asian nations (Suastha, 2016). This may occur due to the fact that reporting on environmental performance in Indonesia is still voluntary.

In 2002, however, the Indonesian government, through its Ministry of the Environment, developed a nationwide evaluation program, namely, Program for Pollution Control, Evaluation, and Rating (PROPER) (Deswanto & Siregar, 2018; Sulaiman, Abdullah & Fatima, 2014). PROPER is an assessment of environmental performance by companies carried out by the Indonesian government. This program aims to increase awareness and efforts of companies to preserve the environment. PROPER has five rankings, namely, gold, green, blue, red, and black, which respectively represent exceptional, excellent, good, bad, and poor rating given to companies based on their performance and environmental disclosures.

This study aims to examine the effect of environmental performance, financial performance, and company characteristic on environmental disclosure within the Indonesian listed companies context by utilizing its national PROPER instrument and the inclusion of ISO 14001 certification as one of the explanatory variables. An environmental management system is a part of the overall management system that includes organizational structure, responsibilities, implementation, procedures, and resources to develop, implement, achieve, evaluate, and maintain environmental policies (ISO 14001, 2004). A good or poor environmental management system of a company can be described by ISO 14001 certification. Companies with this certification indicate that they already have a good environmental management system. Therefore, ISO 14001 certification can be considered one of the proxies in assessing the environmental performance of a company. The findings of this study are expected to assist in the decision-making process related to environmental disclosure as initiated by companies, investors, and regulators. Furthermore, our results are expected to enrich knowledge related to environmental disclosures.

This paper is divided into several sections. Section 2 presents the conceptual background and hypothesis development. Section 3 describes the research method, Section 4 discusses the findings, and Section 5 presents conclusion and limitations.

2. Literature review and hypotheses development

2.1 Literature review
Stakeholder theory states that a company has responsibilities involving several parties, including shareholders and other stakeholders (Freeman et al., 1984). This theory assumes that stakeholders determine the existence of a company. As such, it needs to maintain relationships with stakeholders and avoid disrupting the achievement of company goals. Companies should focus on the environment and long-term sustainable development (Elsayih, Tang & Lan, 2018). One of the efforts to maintaining relationships with stakeholders that can be carried out by a company is providing environmental disclosure (Huang & Kung, 2010). The companies can use environmental disclosure as a means to connect to their stakeholders.

According to legitimacy theory, there is a "social contract" between companies and the society (Deegan, 2000), which leads to the companies disclosing their social and environmental report voluntarily (Luo, Tang & Lan, 2013). Therefore, company managements are expected to provide and disclose their companies' corporate social responsibility activities to the public (Archel et al., 2009; Zhang, Djajadikerta & Trireksani, 2019). Nowadays, the legitimacy theory has become an important theory in environmental disclosure studies that indicates that companies use environmental disclosure as one of their tools to keep their legitimacy.

2.2. Environmental performance

The environmental performance of a company in Indonesia can be revealed by PROPER ratings and environmental management systems. PROPER is a rating system that can indicate a good or bad environmental performance of a company based on the assessment by the Ministry of the Environment. Accordingly, companies with better PROPER ratings could be more easily make more significant environmental disclosures than companies with lower PROPER ratings. Some previous studies have found evidence that the PROPER ranking affects environmental disclosures (Deswanto & Siregar, 2018; Pradini & Kiswara, 2013; Prasetya & Yulianto, 2018; Sulaiman, Abdullah & Fatima, 2014)

Similarly, some companies apply and seek ISO 14001 certification to show that their companies have an excellent environmental management system. Companies that use ISO 14001 on environmental management systems tend to enhance environmental disclosure because they want to show the results of their environmental performance to stakeholders. Some previous studies (Nurhayati, Taylor & Tower, 2015; Yusoff Othman & Yatim, 2013) found a significant relationship between environmental management systems and environmental disclosures. This study proposes the following hypotheses:

H1: Companies with better PROPER ratings would have a higher environmental disclosure than companies with poorer PROPER ratings.

H2: Companies with better environmental management systems would make a greater extent of environmental disclosure than companies with poorer environmental management systems.

2.3. Financial Performance

Financial performance is a measure that can be used to describe the performance of companies in the financial sector. The theory of stakeholders explains that companies are responsive not only to shareholders but also to other stakeholders and the environment. Companies need to carry out activities that can be used to show their responsibilities to stakeholders, and one of them is by providing environment disclosure. The financial performance of a company can be described on the basis of profitability and leverage ratios.

Profitability is a ratio that describes a company's ability to generate profits by using its resources. Companies with a high profitability level likely present a high environment disclosure because profitable companies tend to have more resources to do environmental disclosure. Large resource ownership can be used to show a company's contribution to the environment to reduce social pressure from a community and give a positive impression to stakeholders (Giannarakis, 2014; Ismail et al., 2018). Some previous studies revealed the positive influence of profitability to environmental disclosure (Kansal, Joshi & Batra, 2014; Lu & Abeysekera, 2014; Muttakin & Khan, 2014).

Leverage is a ratio that can describe a company's ability to pay off its debts. Companies with a high leverage level possibly have a great extent of environmental disclosures because companies with high debts need to make other performance disclosures as a form of information that a company is in good condition. Furthermore, companies with a high leverage degree have a large-interest-bearing capital so that the existence of companies depends on lenders. This risk encourages companies to provide evidence of disclosure as a form of concern for the environment (Sulaiman et al., 2014). Some previous studies (Ismail et al., 2018; Yanto & Muzzammil, 2016) found that leverage positively affects environmental disclosure. This study proposes the following hypotheses:

H3: Companies with higher levels of profitability would provide a greater extent of environmental disclosure than companies with lower levels of profitability.

> **H4**: Companies with higher levels of leverage would provide a greater extent of environmental disclosure than companies with lower levels of leverage.

2.4. Company characteristic

Legitimacy theory explains that companies try to ensure that activities are in accordance with norms and rules and accepted by outsiders (Elsayih et al., 2018). Furthermore, operational activities are in a frame, and norms exist in a society and the environment where a company is located; one of these activities that is relevant to this study is environmental disclosure. Companies use environmental-related performance and disclosure to justify a company's operations without endangering the environment (Liao, Luo & Tang, 2015).

One of the characteristics of companies can be observed through the size of a company. Large-categorized companies will receive considerable attention from the public. As such, large-categorized companies will receive more significant pressure from the public. Furthermore, large companies have greater resources and shareholders. This advantage can be used by companies to make environmental disclosures as a way to reduce the existing social pressure. It has been found that in the gas and oil industry, the size of a company positively affects environmental disclosure (Ismail et al., 2018). Some other studies have also found evidence that company size influences environmental disclosure (Ben-Amar & McIlkenny, 2015; Fontana et al., 2015; Ismail et al., 2018; Muttakin & Khan, 2014; Wahyuningrum & Budihardjo, 2018). This study proposes this following hypothesis:

> **H5**: Large companies would present a greater extent of environmental disclosure than smaller companies.

3. Methodology

3.1. Samples and data collection

This research uses secondary data taken from annual reports and sustainability reports of all the listed companies in the Indonesia Stock Exchange (ISX) in 2014–2016. The period of data collection was chosen since 2014 was the year when the country had gained significant continuous improvement in its political stability since the start of the Reformation. In Indonesia, 1998 marked a new era called Reformation, ending the ruling of the previous regime for over three decades, which started the country's road to democracy (Indonesia Investments, n.d.). Data from the Global Economy site showed that the country's political stability index had risen from -1.73 in 1998 to -0.42 in 2014 (Global Economy, n.d.) (this was the year when the country, for the first time, reached an index score above -0.5 since the Reformation era started in 1998). Political stability is essential for business environments since it affects business practice and stakeholder confidence (Euromonitor Research, 2014). The research sample is selected through purposive sampling with the criteria described in Table 1 as follows.

Table 1. Sample selection criteria

Criteria	Number of Samples
ISX registered non-financial companies in 2014–2016	406
Non-financial companies that do not publish reports on social responsibility	346
Non-financial companies that do not provide complete information	24
Non-financial companies used for samples per annum	36
Number of samples (2014–2016)	108
Outliers	36
The total number of samples used (2014–2016)	72

A total of 36 analysis units are categorized as outliers after normality testing. As such, the data are eliminated in this research. The number of analysis units after outlier elimination is 72.

3.2. Variable measurement and analysis

The dependent variable in this research is environmental disclosure (EnvDisc). The indicators are adapted from a sustainability reporting standard, namely, GRI G4 2016, which was developed by the Global Sustainability Standards Board and launched in October 2016. GRI G4 includes reporting indicators on economic, social, and environmental impacts. This research focuses on the indicators of environmental disclosure, and hence adapts only the thirty items of environmental disclosure described in the GRI G4. They consist of three items on material; five items on energy; three items on water; four items on disclosure on biodiversity; seven items on emission; five disclosure items on wastewater (effluent) and solid waste; one disclosure item on compliance; and two disclosure items on harmony. An explanation of each of the environmental disclosure items in the GRI 2016 index is presented in Table 2 as follows.

Table 2. Environmental disclosure items in GRI G4 2016

No	**Indicator**	**Code**	**Explanation**
301	Material	EN1	Materials used based on weight or volume
		EN2	The input material from recycling is used
		EN3	Reclaimed products and their packaging materials
302	Energy	EN4	Energy consumption in organizations
		EN5	Energy consumption outside organizations
		EN6	Energy intensity
		EN7	Reducing energy consumption
		EN8	Reduction in the energy needed for products and services
303	Water	EN9	Water withdrawal based on sources
		EN10	Water sources that are significantly affected by water withdrawal
		EN11	Water recycling and reuse
304	Biodiversity	EN12	Operational locations that are owned, leased, managed, or adjacent to protected areas and areas with high biodiversity values outside protected areas
		EN13	Significant impacts of activities, products, and services on biodiversity
		EN14	Habitat that is protected or returned
		EN15	Number of species included in national conservation data and habitat in areas affected by operations based on the risk of extinction
305	Emission	EN16	Direct GRK emissions
		EN17	Indirect GRK energy emissions
		EN18	Other indirect GRK emissions
		EN19	GRK emission intensity
		EN20	GRK emission reduction
		EN21	Ozone-depleting substances emissions
		EN22	Nitrogen oxide (NOx), sulfur oxide (SOx), and other significant air emissions
306	Wastewater (effluent) and solid waste	EN23	Release of water, based on type and method of disposal
		EN24	Waste based on disposal type and method
		EN25	Significant spill
		EN26	Transport of hazardous waste
		EN27	Water bodies that are affected by the release and overflow of water
307	Compliance	EN28	Noncompliance with environmental laws and regulations

No	**Indicator**	**Code**	**Explanation**
308	Harmony	EN29	Selection of new suppliers using environmental criteria
		EN30	Negative environmental impacts in the supply chain and actions taken

Source: GRI G4 index, 2016

EnvDisc variable is measured using the adapted GRI G4 environmental index by giving a score on environmental disclosure found in each item, that is, 1 for disclosure and 0 for no disclosure. For each sample, all disclosure scores are added so that the total environmental disclosure score for each sample is obtained. The total environmental disclosure score is then divided by 30, which is the total overall environmental disclosure items in the GRI 2016 index, to obtain the mean score.

The effects of the independent variables on the dependent variable (i.e., EnvDisc) are examined through a multiple regression analysis using the SPSS 21 software. The multiple regression equation is explained as follows:

$$EnvDisc = \alpha + \beta_1 EnvPer + \beta_2 EnvMS + \beta_3 Prob + \beta_4 Leve + \beta_5 Size + \beta_6 Board + e,$$

where environmental performance (EnvPer) is measured by giving a score on the ranking color of each company in PROPER:, i.e., black = 1, red = 2, blue = 3, green = 4, and gold = 5; environmental management system measurement (EnvMS) uses a dummy variable with a score of 1 = the company has ISO 14001 and 0 = the company does not have ISO 14001; profitability (Prob) is obtained by dividing profit after tax with total assets; leverage (Leve) in this research is measured by comparing the amount of debt with total assets; and company size (Size) is measured using the natural logarithms of the total asset. This research uses good corporate governance as a control variable that is proxied by the size of the board of commissioners (Board), which is measured by the number of board members of each sample company.

4. Findings and discussion

Environmental disclosures made by each sample company on each of the GRI G4 environmental indicators are presented in Table 3.

Table 3. GRI 2016 Environmental Disclosure Item 2014–2016

No	Indicator	Code	2014	2015	2016
301	Material	EN1	3%	3%	3%
		EN2	4%	4%	4%
		EN3	0%	0%	0%
302	Energy	EN4	3%	3%	3%
		EN5	0%	0%	0%
		EN6	0%	0%	0%
		EN7	10%	14%	13%
		EN8	0%	0%	0%
303	Water	EN9	1%	1%	1%
		EN10	0%	0%	0%
		EN11	4%	4%	4%
304	Biodiversity	EN12	0%	0%	0%
		EN13	0%	0%	0%
		EN14	1%	1%	1%
		EN15	0%	0%	0%
305	Emission	EN16	1%	1%	1%
		EN17	1%	1%	1%

No	Indicator	Code	2014	2015	2016
		EN18	0%	0%	0%
		EN19	0%	0%	0%
		EN20	25%	31%	28%
		EN21	0%	0%	0%
		EN22	0%	0%	0%
306	Wastewater	EN23	1%	1%	1%
	(effluent) and	EN24	3%	3%	3%
	solid waste	EN25	0%	0%	0%
		EN26	1%	1%	1%
		EN27	0%	0%	0%
307	Compliance	EN28	0%	0%	0%
308	Harmony	EN29	0%	0%	0%
		EN30	0%	0%	0%

One item in the emission indicator, i.e., "GRK emission reduction", is disclosed the most by the sample companies (25% in 2014, 31% in 2015, and 28% in 2016). It can be seen that the disclosures made by the entire sample company on this item are much higher than those made on the other items in each period.

The second most revealed item is "reducing energy consumption" within the energy indicator, i.e., 10%, 14%, and 13% respectively in 2014, 2015, and 2016. There is no disclosure found in the compliance and harmony indicators in the sample companies' annual reports, sustainability reports, and/or official websites.

Table 3 also shows that, overall, the extent of environmental disclosure made by the listed companies in the Indonesia Stock Exchange from 2014 to 2016 is low. This low extent of disclosure is purportedly due to the absence of rules that require every company in Indonesia to disclose the environmental performance that they have conducted on their company's official reports and pages.

Table 4 illustrates the comparison of environmental disclosure in each industrial sector in Indonesia in 2014–2016. These sectors include agriculture; mining; basic industry and chemicals; miscellaneous industries; consumer goods industries; trade, service, and investment; and property, real estate, and building.

Table 4. Comparison of GRI G4 environmental disclosure item between sectors

Industry	301	302	303	304	305	306	307	308	Mean
Agriculture	0.0%	0.0%	0.0%	0.0%	14.3%	0.0%	0.0%	0.0%	1.8%
Mining	0.0%	0.0%	33.3%	25.0%	14.3%	0.0%	0.0%	0.0%	9.1%
Basic Industry and Chemicals	13.3%	10.7%	6.7%	0.0%	14.3%	0.0%	0.0%	0.0%	5.6%
Miscellaneous Industries	0.0%	6.7%	0.0%	0.0%	14.3%	0.0%	0.0%	0.0%	2.6%
Consumer Goods Industries	9.7%	8.4%	6.5%	0.0%	10.1%	3.9%	0.0%	0.0%	4.8%
Property, Real Estate, and Building Constructions	0.0%	20.0%	0.0%	0.0%	14.3%	0.0%	0.0%	0.0%	4.3%
Trade, Service, and Investment	0.0%	40.0%	0.0%	0.0%	28.6%	40.0%	0.0%	0.0%	13.6%

Note: 301: Material; 302: Energy; 303: Water; 304: Biodiversity; 305: Emissions; 306: Wastewater (Effluent) and Solid Waste; 307: Compliance; 308: Harmony

Trade, service, and investment are the industry that has the highest level of environmental disclosure based on the GRI G4. This industry makes 40% of energy disclosures, 28.6% of emissions, and 40% of wastewater (effluent) and solid waste, with an average disclosure of 13.6%. It is followed by the mining industry with an average disclosure of 9.1% by disclosing three indicators, namely, water, biodiversity, and emission with disclosure values of 33.3%, 25%, and 14.3%, respectively. Agriculture industry has the least environmental disclosure with only an emission disclosure of 14.3% and an overall average disclosure of 1.8%. This finding shows that environmental disclosures carried out by each industrial sector in Indonesia are overall still relatively low.

Table 5 presents the descriptive statistics of each variable in this study. The dependent variable in this research is environmental disclosure (EnvDisc). EnvDisc has an average value, a minimum value, and a maximum value of 0.064344, 0.0.0333, and 0.2000, respectively. The average value of 6.43% indicates that environmental disclosures in sample companies in Indonesia are relatively low. The independent variables in this research are PROPER (EnvPer) rank, environmental management system (EnvSM), profitability (Prob), leverage (Leve), and company size (Size).

The PROPER (EnvPer) ranking variable based on Table 5 shows that the highest-ranking obtained by the sample companies is "green" with a maximum value of 4.000. Conversely, the lowest rating obtained by sample companies is "red", as evidenced by a minimum value of 2.000, and the average sample company is ranked "blue" with a value of 3.0278. Furthermore, the sample companies have an environmental management system (EnvMS) in the form of ISO certification. As many as 50 sample units have been ISO 14001 certified, whereas 22 sample units have not been ISO 14001 certified.

According to table 5, the profitability variable (Prob) has a minimum value, a maximum value, an average value, and a standard deviation of 0.0008, 0.4394, 0.087517, and 0.0754107, respectively. The lowest and highest leverage variables are 0.0532 and 0.6688, respectively. Company size (Size) has an average value of 29.181656, with a standard deviation of 1.8376017. The standard deviation that is smaller than the average value indicates that the size of the company measured using the total logarithms of a company's asset is considered quite good because this value suggests that the sample is in the average calculation area and that company size data do not significantly differ from one another.

Table 5. Descriptive Statistics of Research Variables

	N	Min	Max	Mean	Std. Deviation
Dependent					
EnvDisc	72	0.0333	0.2000	0.064344	0.0393051
Independent					
EnvPer	72	2.0000	4.0000	3.027778	0.3742494
Prob	72	0.0008	0.4394	0.087517	0.0754107
Leve	72	0.0532	0.6688	0.375971	0.1655904
Size	72	25.1075	32.1510	29.181656	1.8376017
Control					
Board	72	3.0000	9.0000	5.138889	1.6555970
Categorical					
				N	%
EnvMS				72	100
1 = companies that have an ISO 14001				50	69
0 = companies that do not have an ISO 14001				22	31

The results of the normality test via the Kolmogorov–Smirnov test reveal that the data are normally distributed with a significance value of 0.490. Another classic assumption test shows no signs of multicollinearity with tolerance, and the VIF values of each research variable are >0.1 and <10 (Table 6). Furthermore, no problem of autocorrelation occurs because the value of Durbin Watson shows a number of 1.986. This value is greater than dU and smaller than 4-dU 1.8019 < 1.986 < 2.1981. With the heteroscedasticity test involving the white test, where the value of c2 count < c2 table is 45.22 < 91.67, so no symptoms of heteroscedasticity are found.

Table 6 shows the results of the hypothesis testing. First, the PROPER rating (EnvPer) measured using values of 1 to 5 in each rating color obtained by the company is proven to have a significantly positive effect on environmental disclosure. The value of the t count is 2.675, with a significance of 0.009 (sig at 0.05). This finding supports the stakeholder theory, which states that companies are responsible not only for shareholders but also for stakeholders and the environment. This positive influence shows that companies with better PROPER ratings make higher environmental disclosures than companies that obtain poorer PROPER ratings. It may indicate that companies with good PROPER ratings feel the need to do greater environmental disclosure. This disclosure is one of the ways to improve reputation in the view of stakeholders and serve as a "show off" that the companies have a deep concern for the environment. This finding is consistent with previous studies (Deswanto & Siregar, 2018; Pradini & Kiswara; 2013; Prasetya & Yulianto, 2018; Tadros & Magnan, 2019), which found a relationship between PROPER ratings and environmental disclosures.

Table 6. Results of hypothesis testing

Model	Prediction	Unstd Coef		Std Coef	t	Sig.	Multicollinearity	
		B	Std. Error	Beta			Tolerance	VIF
(Constant)		−0.166	0.085		−1.964	0.054		
EnvPer	+	0.030	0.011	0.288	2.675	0.009	0.984	1.017
EnvMS	+	−0.025	0.009	−0.295	−2.649	0.010	0.917	1.090
Prob	+	−0.051	0.063	−0.099	−0.820	0.415	0.786	1.273
Leve	+	0.001	0.028	0.004	0.032	0.975	0.827	1.210
Size	+	0.006	0.002	0.280	2.513	0.014	0.914	1.094
Board	+	−0.003	0.003	−0.119	−1.065	0.291	0.907	1.103

a. Dependent Variable: EnvDisc
$R2 = 0.260$
Adjusted $R^2 = 0.192$
Significance at 0.05
$N = 72$

The second hypothesis states that a company with a good management system makes environmental disclosures higher than a company with a poor unproven management system. EnvMS has a significantly negative effect on environmental disclosure with a t count value of -2,649 and a significance value of 0.010. It may indicate that companies with ISO 140001 certification feel that they have good environmental performance, so they feel that making environmental disclosures is unnecessary because they have successfully obtained this certification. Conversely, companies that do not yet have an ISO 14001 certificate feel the need to make environmental disclosures as a form of positive signaling to the public that the company has carried out their environmental performance well as evidenced by conducting environmental disclosures. Some previous studies (Ismail et al., 2018; Nurhayati et al., 2015; Yusoff et al., 2013), however, found no evidence that EnvMS affects environmental disclosure.

Third, profitability (Prob) does not have a significant effect on environmental disclosure. The results of this test do not support the stakeholder theory, which states that companies are responsive not only to shareholders but also to stakeholders and the environment. This may indicate that companies with high profitability assume that they do not need to disclose matters that may interfere with information related to their financial success, including making environmental disclosures. Such companies may consider that environmental disclosure could disrupt the focus of a community to obtain information on the success of a particular company so that it will not conduct environmental disclosures with the aim that stakeholders focus more on information on their financial success. The study of Qiu, Shaukat and Tharyan (2016) on non-financial companies in the United Kingdom in 2005–2009, also found no relationship between environmental disclosure and company profitability. This finding is also supported by the previous studies by Nor, Bahari, Adnan, Kamal and Ali (2016) and Wahyuningrum and Budihardjo (2018), and some other studies with slightly different findings (Kansal et al., 2014; Lu & Abeysekera, 2014; Muttakin & Khan, 2014).

Fourth, leverage (Leve) that is measured using debt to assets is not proven to influence environmental disclosure. The test results presented in Table 5 reveal that the value of the t count is 0.032, with a significance value of 0.975 > 0.05. This finding does not support the stakeholder theory, which states that companies are responsive not only to shareholders but also to stakeholders and the environment. This insignificant influence may be caused by a good relationship between a company and a debtholder. This good relationship prevents a debtholder from paying too much attention to information related to environmental disclosures. A company uses this scheme as an opportunity to avoid making environmental disclosure because it focuses on maintaining good relations with debtholders. Furthermore, environmental disclosures may be considered as costs that can reduce the profits earned. Hence, they prefer to allocate profits to pay debts and maintain good relations with debtholders rather than making environmental disclosure. These results are consistent with the previous study (Deswanto & Siregar, 2018) that did not find a significant effect of leverage on environmental disclosure. Conversely, another study (Ismail et al., 2018) found a significant effect of leverage on environmental disclosure.

Fifth, the size of the company (Size) in this research has a significantly positive effect on environmental disclosure with a t count value of 2.513 and a significant level of 0014 < 0.05. The results of the test support the legitimacy theory, which explains that companies that make environmental disclosures carry out an activity that can be accepted by society. This observation is reinforced by the results of the test, which shows the t count value of 2.513 with a significance level of 0.014 < 0.05.

Large companies tend to receive considerable attention from communities, so they receive a high amount of pressure. Large companies have greater resources and shareholders, so the environmental disclosure made by these companies is greater than that of small-categorized companies. These results are consistent with those of Choi, Lee and Psaros (2013), who found that the size of a company affects the disclosure of carbon emissions in companies in Australia. This finding was also supported by the previous studies (Ben-Amar & McIlkenny, 2015; Fontana et al., 2015; Ismail et al., 2018; Kansal et al., 2014; Muttakin & Khan, 2014; Wahyuningrum & Budihardjo, 2018; Yanto & Muzzammil, 2016) that found a significantly positive relationship between company size and environmental disclosure. However, these results do not support the research conducted by a previous study Gatimbu & Wabwire(2016) that did not find any influence of company size on environmental disclosure.

The control variable in this research is the board of commissioners (Board) proxied by the number of the board of commissioners in each company. The study does not find that this variable has a significant influence on environmental disclosures. The value of the t count is -1.065, with a significance of 0.907 > 0.05. This finding does not support the stakeholder theory. This nonsignificant influence may be due to the position of the board of

commissioners, who are representatives of shareholders, which encourage them to use profits for operational activities that are more profitable for companies than using them for social activities. The absence of this social activity may make companies with larger board of commissioners do not make environmental disclosures. These results contradict the findings of a previous study by Fernandes, Bornia, and Nakamura (2019) that examined the influence of the board of directors on environmental disclosures at the Sao Paulo Stock Exchange registered in Brazil.

5. Conclusion

Based on the disclosure index, most item disclosed by companies in their annual reports, sustainability reports, and/or official websites is "GRK emission reduction" followed by "reducing energy consumption" within the energy indicator in three years period (2014-2016). In contrast, it seems that all companies do not disclose one indicator item, namely compliance and harmony even in their annual reports. Generally, it can be concluded that the extent of environmental disclosure referred to GRI G4 is low. This low level of environmental disclosure indicates that most of the Indonesian companies have not yet kept an eye on the standard of sustainability reporting. Some of them do not provide any information about environmental in their annual reports and or sustainability reports. Since the disclosure is still voluntary, many companies still have not followed the standards and regulations.

Environmental performance is a form of company awareness in managing its resources for environmental management. This study used two measurements, namely PROPER and ISO 14001. According to PROPER rating, most companies have a "blue" rank, and the lowest rating companies have a "red" rank. In addition, more than 50% of companies have been ISO 14001 certified. This study found that PROPER rank has a significant effect on the extent of environmental disclosure; meanwhile, the environmental management system, proxied by ISO 14001, has a significantly negative effect on the extent of environmental disclosure. This results may indicate that most companies in reporting their environmental activities still do not follow the GRI guidelines even though some of them have ISO 140001 certification. The relationship between company characteristic, which is described in terms of company size, the environmental disclosure is significantly positive. The results of this study support the legitimacy theory and provide some indication that large companies feel that they have more responsibility to society and, therefore, provide a greater extent of environmental disclosure in their reports. However, the financial performance, which is described by profitability and leverage, found to have no effect on the environmental disclosures.

Overall, the findings of this study may be useful for companies, investors, and regulators in formulating policies to make decisions related to environmental disclosure. This study is also expected to provide further insights into environmental disclosure literature. This study, nevertheless, acknowledges some limitations. Firstly, many companies do not include environmental disclosures in annual reports and sustainability reports. As such, the samples obtained are rather limited. This study also uses the GRI G4 2016 index as a tool to measure environmental disclosures. Further studies could explore and use another proxy. Future studies should also consider other variables that likely influence environmental disclosures.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

References

Archel, P.; Husillos, J.; Larrinaga, C.; Spence, C. 2009. Social disclosure, legitimacy theory and the role of the State, *Accounting, Auditing and Accountability Journal* 22(8): 1284-1307. https://doi.org/10.1108/09513570910999319https://doi.org/10.1108/09513570910999319

Bhatia, A; & Makkar, B. 2019. CSR disclosure in developing and developed countries: a comparative study, *Journal of Global Responsibility* 11(1): 1-26. https://doi.org/10.1108/JGR-04-2019-0043

Ben-Amar, W.; & McIlkenny, P. 2015. Board effectiveness and the voluntary disclosure of climate change information, *Business Strategy and the Environment* 24(8): 704-719. https://doi.org/10.1002/bse.1840

Branco, M. C., & Rodrigues, L. L. 2008. Factors influencing social responsibility disclosure by Portuguese companies, *Journal of Business Ethics*, 83(4), 685-701. https://doi.org/10.1007/s10551-007-9658-z

Choi, B.B.; Lee, D.; & Psaros, J. 2013. An analysis of Australian company carbon emission disclosures. *Pacific Accounting Review* 25(1): 58-79. https://doi.org/10.1108/01140581311318968

Cormier, D.; Magnan, M.; & Van Velthoven, B. 2005. Environmental disclosure quality in large German companies: economic incentives, public pressures or institutional conditions?, *European Accounting Review* 14(1): 3-39. http://dx.doi.org/10.1080/0963818042000339617

Deswanto, R.B.; & Siregar, S.V. 2018. The associations between environmental disclosures with financial performance, environmental performance, and firm value, *Social Responsibility Journal* 14(1): 180-193. https://doi.org/10.1108/SRJ-01-2017-0005

Devie, D.; Kamandhanu, J.; Tarigan, J.; & Hatane, S.E. 2019. Do environmental performance and disclosure bring financial outcome? Evidence from Indonesia, *World Review of Science, Technology and Sustainable Development* 5(1): 66-86. https://dx.doi.org/10.1504/WRSTSD.2019.098681

Djajadikerta, H.G.; & Trireksani, T. 2012. Corporate social and environmental disclosure by Indonesian listed companies on their corporate web sites, *Journal of Applied Accounting Research* 13(1): 21-36. https://doi.org/10.1108/09675421211231899

Elijido-Ten, E. 2007. Applying stakeholder theory to analyze corporate environmental performance: Evidence from Australian listed companies, *Asian Review of Accounting*, 15(2), 164-184. http://dx.doi.org/10.1108/13217340710823378

Elsayih, J.; Tang, Q.; & Lan, Y. 2018. Corporate governance and carbon transparency: Australian experience, *Accounting Research Journal* 31: 405-422. https://doi.org/10.1108/ARJ-12-2015-0153

Euromonitor Research. 2014. *Changes in Political Stability Impact Business Environments in Emerging Markets.* https://blog.euromonitor.com/changes-in-political-stability-impact-business-environments-in-emerging-markets/

Fernandes, S.M.; Bornia, A.C.; Nakamura, L.R. 2019. The influence of boards of directors on environmental disclosure, *Management Decision* 57(9): 2358-2382. https://doi.org/10.1108/MD-11-2017-1084

Fontana, S.; D'Amico, E.; Coluccia, D.; & Solimene, S. 2015. Does environmental performance affect companies' environmental disclosure? *Measuring Business Excellence* 19(3): 42-57. https://doi.org/10.1108/MBE-04-2015-0019

Freeman, R.E. 1984. Strategic Management: A Stakeholder Approach Boston: Pitman.

Gatimbu, K.K.; & Wabwire, J.M. Effect of corporate environmental disclosure on financial performance of firms listed at Nairobi Securities Exchange Kenya, *International Journal of Sustainability Management and Information Technologies* 2(1): 1-6. https://doi.org/10.11648/j.ijsmit.20160201.11

Giannarakis, G. 2014. The determinants influencing the extent of CSR disclosure. *International Journal of Law and Management* 56(5): 393-416. https://doi.org/10.1108/IJLMA-05-2013-0021

Global Economy. n.d. *Indonesia: Political stability.* https://www.theglobaleconomy.com/Indonesia/wb_political_stability/

Bidari, G.; & Djajadikerta, H.G. 2020. Factors influencing corporate social responsibility disclosures in Nepalese banks, *Asian Journal of Accounting Research* Ahead of print.

Huang, C,L; & Kung, F.H. 2010. Drivers of Environmental Disclosure and Stakeholder Expectation: Evidence from Taiwan, *Journal of Business Ethics* 96 (3): 435-451. https://doi.org/10.1007/s10551-010-0476-3

Indonesia Investments. n.d. *Reformation; New Challenges & Changes for Indonesia.* https://www.indonesia-investments.com/culture/politics/reformation/item181

Inekwe, M.; Hashim, F; & Yahya, S.B. 2020. CSR in developing countries – the importance of good governance and economic growth: evidence from Africa, *Social Responsibility Journal* Ahead of print. https://doi.org/10.1108/SRJ-10-2019-0336

Ismail, A.H.; Rahman, A.A.; & Hezabr, A.A. 2018. Determinants of corporate environmental disclosure quality of oil and gas industry in developing countries, *International Journal of Ethics and Systems* 34(4): 527-563. https://doi.org/10.1108/IJOES-03-2018-0042

Kansal, M.; Joshi, M.; & Batra, G.S. 2014. Determinants of corporate social responsibility disclosures: Evidence from India, *Advances in Accounting* 30(1): 217-229. https://doi.org/10.1016/j.adiac.2014.03.009

Liao, L.; Luo, L.; & Tang, Q. 2015. Gender diversity, board independence, environmental committee and greenhouse gas disclosure, *The British Accounting Review* 47(4): 409-424. https://doi.org/10.1016/j.bar.2014.01.002

Lima Crisóstomo, V.; de Souza Freire, F.; & Cortes de Vasconcellos, F. 2011. Corporate social responsibility, firm value and financial performance in Brazil, *Social Responsibility Journal* 7(2): 295-309. http://dx.doi.org/10.1108/17471111111141549

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Liu, X., & Anbumozhi, V. (2009). Determinant factors of corporate environmental information disclosure: an empirical study of Chinese listed companies. *Journal of Cleaner Production* 17(6): 593-600. http://dx.doi.org/10.1016/j.jclepro.2008.10.001

Lu, L.W.; & Taylor, M.E. 2018. A study of the relationships among environmental performance, environmental disclosure, and financial performance, *Asian Review of Accounting* 26(1): 107-130. https://doi.org/10.1108/ARA-01-2016-0010

Lu, Y.; & Abeysekera, I. 2014. Stakeholders' power, corporate characteristics, and social and environmental disclosure: Evidence from China, *Journal of Cleaner Production* 64(1): 426-436. https://doi.org/10.1016/j.jclepro.2013.10.005

Luo, L.; Tang, Q.,; & Lan, Y. 2013. Comparison of propensity for carbon disclosure between developing and developed countries: A resource constraint perspective, *Accounting Research Journal* 26(1): 6-34. https://doi.org/10.1108/ARJ-04-2012-0024

Muttakin, M.B.; & Khan, A. 2014. Determinants of corporate social disclosure: Empirical evidence from Bangladesh, *Advances in Accounting* 30(1): 168-175. https://doi.org/10.1016/j.adiac.2014.03.005

Nor, N.M.; Bahari, N.A.S.; Adnan, N.A.; Kamal, S.M.Q.A.S.; & Ali, I.M. 2016. The effects of environmental disclosure on financial performance in Malaysia, *Procedia Economics and Finance* 35: 117-126. https://doi.org/10.1016/S2212-5671(16)00016-2

Nurhayati, R.; Taylor, G.; & Tower, G. 2015. Investigating social and environmental disclosure practices by listed Indian textile firms, *The Journal of Developing Areas* 49(6): 361-372. https://doi.org/10.1353/jda.2015.0109

Ong, T.; & Djajadikerta, H.G. 2018. Corporate governance and sustainability reporting in the Australian resources industry: an empirical analysis, *Social Responsibility Journal* 16(1): 1-14. https://doi.org/10.1108/SRJ-06-2018-0135

Ong, T.; Trireksani, T; & Djajadikerta, H.G. 2016. Hard and soft sustainability disclosures: Australia's resources industry, *Accounting Research Journal* 29(2): 198-217. https://doi.org/10.1108/ARJ-03-2015-0030

Patten, D. M. 2002. The Relation between Environmental Performance and Environmental Disclosure: a Research Note. *Accounting, Organizations and Society*, 2(7): 763-773. https://doi.org/10.1016/S0361-3682(02)00028-4

Plumlee, M. D.; Brown, R. M.; Hayes; & R. S. Marshall. 2015. Voluntary environmental disclosure quality and firm value: Further evidence. *Journal of Accounting and Public Policy* 34(4): 1-26. https://doi.org/10.1016/j.jaccpubpol.2015.04.004

Pradini, H.S.; & Kiswara, E. 2013. The analysis of information content towards greenhouse gas emissions disclosure in Indonesia's companies, *Diponegoro Journal of Accounting* 2(2): 1-12.

Prasetya, R.A.; & Yulianto, A. 2018. Analysis of factors affecting the disclosure of corporate carbon emission in Indonesia, *Jurnal Dinamika Akuntansi* 10(1): 71-81. http://doi.org/10.15294/jda.v10i1.12653

Purwantini, C.; Faisal, F.; Januarti, I.; & Dwiatmoko, I.A. 2019. The relationship between environmental performance and the extent of environmental disclosure, *Humanities & Social Sciences Reviews*, 7(4): 493-501. https://doi.org/10.18510/hssr.2019.7466

PROPER. 2016. Proper Report 2016: Program Rating of Company Performance in Environmental Management. Jakarta: PROPER Secretariat Office of Environment & Forestry Ministry

Qiu, Y.; Shaukat, A.; & Tharyan, R. 2016. Environmental and social disclosures: Link with corporate financial performance, *The British Accounting Review* 48(1): 102-116. https://doi.org/10.1016/j.bar.2014.10.007

Sen, M.; Mukherjee, K.; & Pattanyak, J.K. 2011. Corporate environmental disclosure practices in India, *Journal of Applied Accounting Research* 12(2): 139-156. https://doi.org/10.1108/09675421111160709

Sharma, E. 2019. A review of corporate social responsibility in developed and developing nations, *Corporate Social Responsibility and Environmental Management* 26(4): 712-720. https://doi.org/10.1002/csr.1739

Suastha, R.D. 2016. July 2016. Riset Temukan Kualitas CSR Perusahaan Indonesia Rendah. Retrieved from https://www.cnnindonesia.com/nasional/20160721074144-20-146030/riset-temukan-kualitas-csr-perusahaan-indonesia-rendah

Sulaiman, M.; Abdullah, N.; & Fatima, A.H. 2014. Determinants of environmental reporting quality in Malaysia, *International Journal of Economics, Management and Accounting* 22: 63-90.

Tadros, H.; & Magnan, M. 2019. How does environmental performance map into environmental disclosure? *Sustainability Accounting, Management and Policy Journal* 10(1): 62-96. https://doi.org/10.1108/sampj-05-2018-0125

Trireksani, T.; & Djajadikerta, H. 2016. Corporate governance and environmental disclosure in the Indonesian mining industry, *Australasian Accounting Business and Finance Journal* 10(1): 18-28. https://doi.org/10.14453/aabfj.v10i1.3

Wahyuningrum, I.F.S.; & Budihardjo, M.A. 2018. Relationship between company financial performance, characteristic and environmental disclosure of ASX listed companies. *E3S Web Conf.* Vol. 73. https://doi.org/10.1051/e3sconf/20187310024

Yanto, H.; & Muzzammil, B.S. 2016. A long way to implement environmental reporting in Indonesian mining companies, International *Journal of Applied Business and Economic Research* 14: 6493-6513. http://dx.doi.org/10.2139/ssrn.2908974

Yusoff, H.; Othman, R.; & Yatim, N. 2013. Environmental reporting practices in Malaysia and Australia, *Journal of Applied Business Research* 29(6): 1717-1726. https://doi.org/10.19030/jabr.v29i6.8209

Zhang, J.; Djajadikerta, H.G; & Trireksani, T. 2019. Corporate sustainability disclosure's importance in China: Financial analysts' perception, *Social Responsibility Journal* Ahead of print. https://doi.org/10.1108/SRJ-10-2018-0272

Zhang, J.; Djajadikerta, H.G.; & Zhang, Z. 2018. Does sustainability engagement affect stock return volatility? Evidence from the Chinese financial market, *Sustainability*, 10: 3361. https://doi.org/10.3390/su10103361

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Indah Fajarini Sri WAHYUNINGRUM is Secretary of Accounting Department, Faculty of Economics, Universitas Negeri Semarang (UNNES), Indonesia, from 2018 onwards. She took her Doctoral Degree in 2013 and graduated in 2017 at Edith Cowan University, Perth, Western Australia. She completed her bachelor's and Master's degree at Universitas Diponegoro (UNDIP). She has been actively teaching subjects such as Accounting Principles, Advanced Accounting, Accounting Theory, Research Methodology, etc. Her research and publication interests include environmental accountinf, sustainability reporting, and sustainability. She is also a member of Institute of Certified Sustainability Practitioners (ICSP) and Chartered Accountants Indonesia (IAI) until now.
ORCID ID: orcid.org/0000-0003-3246-4101

Mochamad Arief BUDIHARDJO is an Associate Professor at the Department of Environmental Engineering, Diponegoro University, Indonesia. His teaching areas are solid waste management, environmental economics, and environmental management at both undergraduate and postgraduate levels. His research and publication interests include environmental management (particularly solid waste) and environmental sustainability. Currently, he is managing a sustainability center at his university. He is also a member of the International Solid Waste Association, Indonesian Society of Sanitary and Environment Engineers (IATPI), and the Institution of Engineers Indonesia (PII). **ORCID ID:** orcid.org/0000-0002-1256-3076

Fadel Iqbal MUHAMMAD is an MSc Environmental Sciences student at Wageningen University & Research (WUR), the Netherlands, and a research assistant at Diponegoro University, Indonesia. He received a fellowship from the Indonesian Endowment Fund (LPDP) because of his contribution to community development on resilient communities. He is actively involved in conducting research related to environmental system engineering, especially about carbon footprint assessment and solid waste management.
ORCID ID: 0000-0002-0156-3775

Hadrian Geri DJAJADIKERTA is Associate Dean Research and Associate Professor in the School of Business and Law at Edith Cowan University, Perth, Australia. Hadrian has over two decades of leadership, research, and teaching in academia, and has previously held academic positions at the University of New South Wales, Lincoln University, and the University of Technology Sydney. His research interests include sustainability and sustainability reporting, strategic management accounting, corporate governance, corporate social responsibility (CSR), strategic alliances, and inter-firm relationships.
ORCID ID: orcid.org/0000-0003-1672-9579

Terri TRIREKSANI is Honours Coordinator in Business and Lecturer at Murdoch Business School, Murdoch University, Perth, Australia. Terri's prior experience includes years of work in academia, public accounting, and consulting for various public and private organizations in Indonesia and the US. Her research interests include sustainability reporting, accounting education, strategic management accounting, and diversity management.
ORCID ID: orcid.org/0000-0003-4512-9310

_____

DESIGN AND EVALUATION OF EFFICIENCY OF MACRO - LOGISTIC SYSTEMS FOR COUNTRIES WITH DEVELOPING ECONOMY

Yerlan Kunyazov [1], Yertargyn Shakhman [2], Saule Rakhimova [3], Alma Mussina [4], Takhir Ernazarov [5]

[1,2,3,4,5] *S. Toraighyrov Pavlodar State University, Lomov 64 street, Pavlodar, Kazakhstan*

E-mails:[1] kunyazov.erlan@mail.ru ; [2] Shakhman2015@mail.ru;
[3] saulesha_rahimova@mail.ru; [4] alma1404@yandex.kz; [5] denat_et@mail.ru

Abstract. In modern conditions, improving the efficiency of logistics is of particular importance, especially for countries with developing economies. The development of logistics acts as a driver of the competitiveness of the country's economy, improving the quality of life of the population, and rational integration into the world economy. Therefore, the states of countries with developing economies face the global task of becoming a certain transit and logistics hub of the region, a "bridge" between Europe and Asia, the implementation of which directly depends on the development of transport logistics, the main factor in stimulating sustainable rates of industrial growth and the formation of competitive advantages of the economic system. The toolkit developed by the author and the results obtained can be used by state and local authorities in the development of strategies for the development of macrological systems in countries with developing economies for the medium term.

Keywords: logistics; macro-logistic systems; material and intangible logistics flows; logistics infrastructure; the mechanism of functioning of the macro-logistic system

1. Introduction

Analysis of the state and development trends of logistics in the world economy shows that in many respects the state of logistics and supply chain management (SCM) is a key factor in increasing the competitiveness potential. The global economic crisis, which over the past decades, has clearly demonstrated how important is the ability of macrologistic systems not only to reduce costs, but also to find new innovative solutions to maintain business stability in difficult and poorly predictable macroeconomic conditions. Those systems that were able to correctly assess the situation and reorganize in time to new rails of integration and coordination, both of internal logistics

business processes and relationships with counterparties in supply chains, were able not only to maintain their positions, but also to achieve significant results in increasing competitiveness and strengthening market positions. In a modern economy, the use of the principles of integrated logistics is one of the basic sources of sustainable competitive advantage for logistics systems. That is why the world's leading companies are making significant efforts to improve the efficiency of supply chains, focusing on the active involvement of logistics providers, the globalization of the location of production and logistics facilities and the implementation of the principles of integrating logistics business processes in building a business.

An effective logistics system is capable of speeding up the industrialization of the country through convergence within industrial centers, as well as creating a basis for deepening regional and Eurasian economic cooperation and further integration of countries into the world economy. Moreover, the strategically advantageous geographic location of the country allows you to receive a significant source of income through the active implementation of transit opportunities.

The intensive development of the logistics services market, the creation of a competitive environment in the field of commodity circulation and international transportation of goods, the strengthening of integration trends in the world economy make it necessary to search for adequate market mechanisms to ensure the effective functioning of the transport complex, which are considered logistics and logistics management. Hence follows the high urgency of solving problems aimed at the development of transport and logistics infrastructure, in particular, at the formation of transport and logistics hubs, as an integral and key component that ensures an increase in the efficiency of the transport complex. In the Kazakh economy, as in a country with a developing economy, logistics is a fairly young industry and, following the example of foreign countries, is only turning into a practical tool for a market economy.

2. Research background

To position and use the best practices of leading companies and countries in the field of logistics, special analytical tools are needed, in particular international ratings, which have become a source of information for analytics.
The analysis of approaches and ratings of logistics efficiency assessment at the country level existing in the world practice is presented in separate publications of such authors as V.I.Sergeev, D.I. Zinina (2016), A.P. Dolgov (2015, 2016), and others.

Professor A.P. Dolgov (2016), who studies the problems of assessing logistics in international rankings, identifies the following key points of a methodological nature:
- selection of a set of indicators that most fully characterize the evaluated phenomenon or process;
- the choice of a rational ratio between objective indicators and subjective assessments of quality characteristics;
- determination of weight coefficients characterizing the significance of certain particular indicators, estimates.
Until now, no single, well-established definition of the logistics system has been formed. According to E. Yu. Alekseycheva (2015), quite often in the economic literature there is a definition according to which a logistic system is understood as an adaptive system with feedback, which performs certain logistic operations and functions. Moreover, such a system consists of several subsystems, has developed connections with the external environment. In addition, there is another definition of V.V. Gabbasova (2016), who claims that the logistics system is a system for managing logistics processes that have feedback. These processes operate in a single multi-level structure, with a single center for the distribution of resources according to established criteria for the effectiveness of their use. This means that the system makes it possible to ensure the implementation of logistics

operations with optimal costs for moving products throughout the supply chain. Therefore, an enterprise that has organized a logistics service is able to effectively solve problems associated with reducing costs, distributing and storing products, and reducing inventories. The saved costs allow to reduce the production cost. Some researchers, such as O.S. Damdyn (2015) notes that transport logistics is understood as the organization of functioning and management of material flows, as well as the corresponding supporting and accompanying flows in the process of goods movement. Other scholars, like B. Galstyan (2018), give a broader definition of the term. They emphasize that transport logistics is the movement of products by vehicles using a specific technology, specific routes in the supply chain. Such logistics consists of logistic, technological operations and functions. At the same time, it includes forwarding, cargo handling, packaging, transfer of ownership of the cargo, prevention of threats, insurance of risks, customs procedures, etc.

Analysis of the points of view of foreign authors made it possible to single out three definitions of the logistics infrastructure:

  - according to D. Greenwald (1973) - this is a set of service industries, the list of which varies depending on the object and the operational composition of the activities of service subjects;

  - W. Stanton (1978) claims that this is a set of material and technical means that provide normal conditions for the activities of economic entities;

  - research of W. Rostow (1960) They agree that this is a set of conditions that create favorable preconditions for the development of commodity circulation in industries that meet the needs of the population.

According to A.M. Gadzhinsky (2018), the specificity of logistics consists in the allocation of a single function of management of previously disparate material flows; in the technical, technological, economic and methodological integration of individual links of the material-conducting chain into a single system that ensures effective management of end-to-end material flows.

Well-known approaches to assessing and predicting the effectiveness of logistics systems under given conditions, set forth in the works of the following domestic and foreign researchers (Table 1).

Table 1. Approaches to assessing and predicting the effectiveness of logistics systems in given conditions

Author	Approaches to assessing and predicting the effectiveness of logistics systems
Anikin B. (2016)	Criteria for the level of service in logistics are stated, where two areas of global importance are considered, associated with global logistics and logistics of "slender" production, as well as the problem of integrating organizations into the global logistics network
Gutthorna J. (2018)	Shows production and logistics activities in a smooth integration into supply chains of key business processes: production, distribution, transportation, forecasting and planning of demand, inventory management, service management and supply of spare parts, controlling and management of return material flows
Dolgov A. (2015)	The modern economic problems of regulation of flow processes and inventories in macrologistic systems of various hierarchical levels are considered
Dybskaya B. (2015)	A detailed analysis of the logistics process in a warehouse based on functional modeling is given. Specific recommendations for practitioners on the effective design and use of warehouse systems, optimization of the choice of technological and handling equipment for warehouses, planning of warehouse areas and other urgent problems of warehousing logistics are given
Kurenkov P. (2016)	The research focuses on warehouses in logistics, which perform the function of accumulating reserves, which are necessary to mitigate and damp fluctuations in the volume of demand and supply, thereby allowing the use of these resources in the event of a shortage of products on the market
Levkin G. (2019)	A comprehensive understanding of the features of material flow management in industry and trade is considered
Shulzhenko T. et al. (2017)	The classification of models and methods used in the theory of logistics is considered; analyzed

	the most famous approaches used in procurement, production and distribution logistics
Mirotin L., Levin, B. (2015)	The issues of innovative processes in the field of transport management are considered, such as trends in the development of the transport industry and the development of concepts, models and mechanisms of logistics management of an intelligent transport system
Myasnikova L. (2016)	Examines modern problems of logistics management as the most important tool for increasing the competitiveness of companies in the market
Prokofieva T., Lopatkin O. (2017)	The problems of formation and development of regional logistics transport and distribution systems are investigated
Sergeev V., Zinina D. (2016)	Analysis of the approaches and ratings of logistics efficiency assessment at the country level existing in the world practice. It is shown that the objectivity of assessing the effectiveness of logistics can be increased using regression models that reveal the relationship between macroeconomic indicators and the level of development of logistics in a particular country. The proposed models help to minimize the impact of subjective expert assessments on the final ratings
Scherbakov B. (2018), Jiao et al. (2019); Adeniran, A.O., Obembe, O.E. (2020); Mader Michelle, M., Suski Cássio, A. (2019)	Shows a view of logistics as a field of entrepreneurial activity in the management of material, information, financial and other flows. Covers the basic concepts of logistics, substantiates the functional unity and efficiency of logistics solutions

Thus, in the development of the transport and logistics system, an important place is occupied by the formation of a logistics infrastructure, regarding the essence and content of which there are different points of view and components of the infrastructure of logistics processes. Investigating the management of integrated logistics systems in the digital economy, N.A. Gvilia, A.V. Parfenov, T.G. Shulzhenko (2019) established a relationship between the level of logistic integration and the form of intercorporate logistic formations, which made it possible to select management tools for certain forms of intercorporate logistic formations, including those based on the use of digital technologies. In the work of M. Adamczak, R. Domanski, L. Hadas, P. Cyplik (2016) aspects of the formation of integration relationships between production and logistics systems and elements of the external environment are considered. O. Mortansen, O. Lemoine (2008) investigates the system integration relationships between manufacturing enterprises and 3PL logistics providers.

Questions about measuring the strength of integration relationships between elements of intersystem logistics education are considered in the works of P. Cyplic, L. Hadas, M. Adamczak, R. Domanski, M. Kupczyk, Z. Pruska (2014), where an approach to measuring the level of integration in supply chains is proposed based on the ranking of local levels of integration in the implementation of integration processes in the supply chain.

At the same time, the development of digital technologies is of great importance, including in the management of logistics activities, which makes it possible to form tools for increasing the efficiency of the activities of both individual entities and the intersystem entities formed by them. In his scientific works, Y. Kayikci (2018) just describes the depth of interorganizational logistic integration, which is determined by the form of intercorporate interaction.

C. Wong, S. Boonitt, C. Wong (2011) investigated the principles of information integration of elements in supply chains, which make it possible to assert that for the forms of interorganizational interaction, estimates can be made that characterize the levels of logistic integration, which will differ significantly. V. Lukinskiya, V. Lukinskiya, T. Shulzhenko, T. (2017) describes logistic systems that are formed with the help of various types of logistic integration, which are considered as a combination of activities, complex implementation of functions and management influences, interaction of participants in the process.

Cluster forms of the logistic system, which are reflected in the works of L. Rivera, Y.Sheffi, D. Knoppen (2016) have been studied more deeply.

Thus, in the development of the transport and logistics system, an important place is occupied by the formation of a logistics infrastructure, regarding the essence and content of which there are different points of view and components of the infrastructure of logistics processes.

3. Research questions

To assess the effectiveness of macrological systems for countries with emerging economies, authors had determined the rating of the EAEU member states by logistics efficiency sub-indices among the CIS countries.
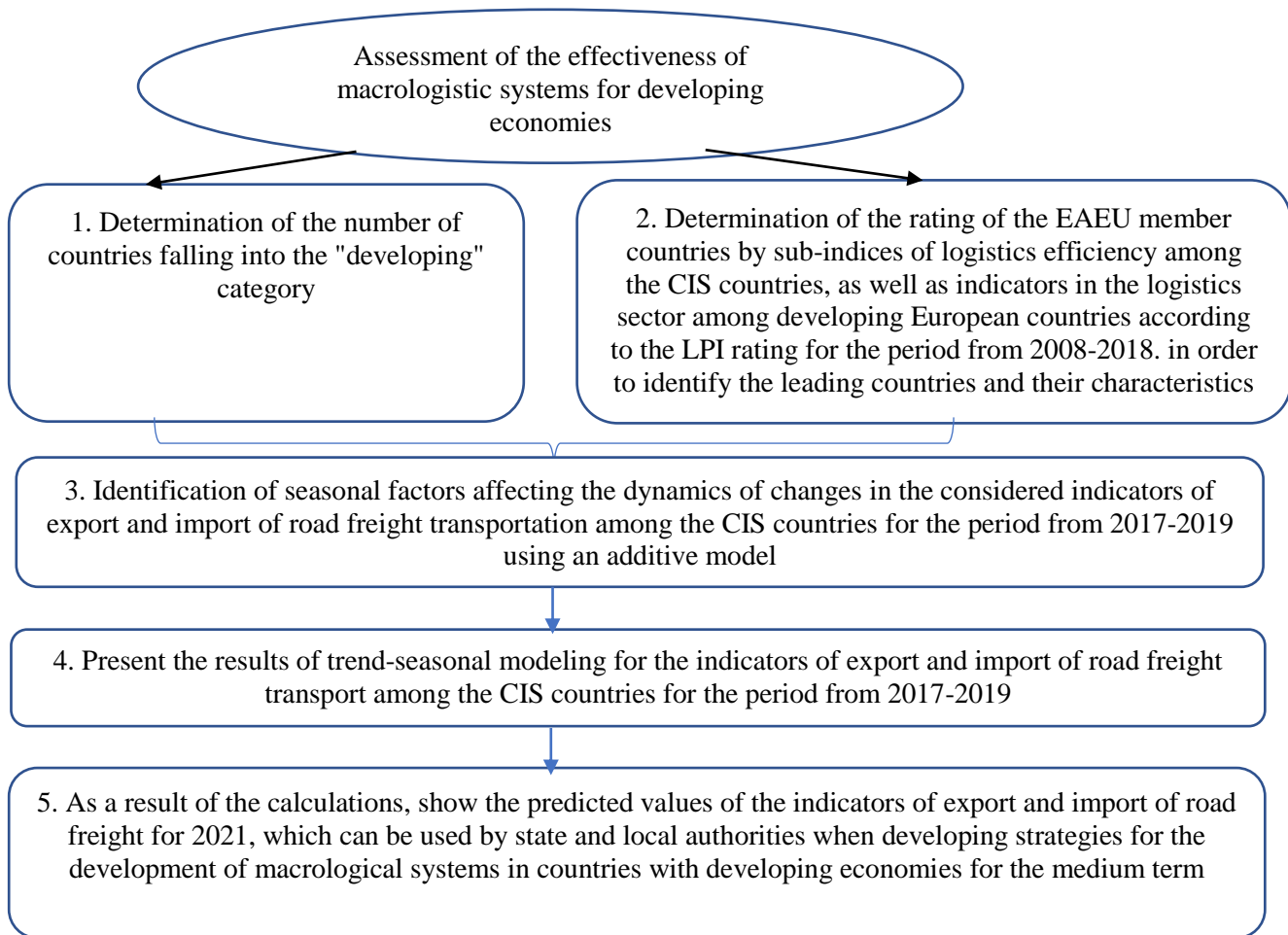

Figure 1. Research questions
Source: compiled by authors

According to the opinions of international experts, in order to identify the efficiency of logistics in developing countries at the proper level, recommendations were made, on the basis of which the author of the article reviewed the monthly indicators of exports and imports using the example of road freight transportation among

the CIS countries for 2017-2019. To construct predicted values of export and import indicators using the example of road freight transport among the CIS countries, it is necessary to consider a trend-seasonal model, the results of which will allow us to draw conclusions about an increase in the volume of export of road freight transport among the CIS countries and make informed and effective logistics decisions (Figure 1).

The development of logistics and its investment is carried out in various countries according to individual scenarios, adjusted for the peculiarities of national economic policy, geographic, demographic characteristics, urbanization and the level of development of the general infrastructure of specific regions. This is evidenced by the predicted values of exports and imports of road freight for 2021 among the CIS countries, the conclusions of which will make it possible to adopt an effective strategy for the development of transport logistics based on the results of trend-seasonal modeling.

4. Methodological approach

In accordance with the current rules and requirements of the market, companies provide complex logistics services that are most beneficial for customers. The number of logistics providers is constantly increasing, therefore, the quality of the services provided is growing at the same time.
In the logistics service, there are five approaches, which represent different levels of provision of logistics services in the enterprise (Figure 2).
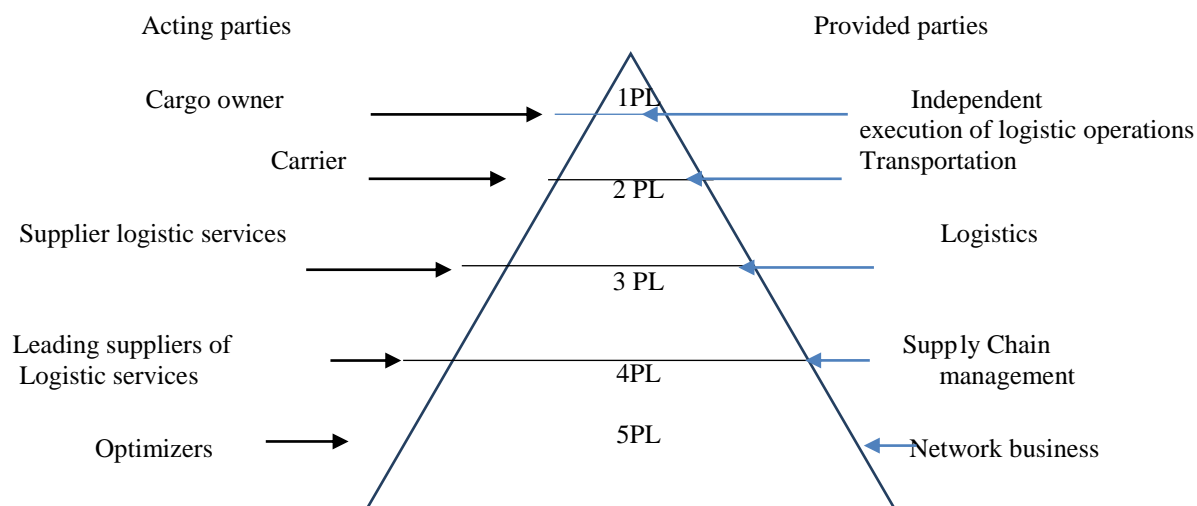
Figure 2. Concept 5- PL logistics
Source: compiled by authors

As you can see from Figure 2, there are currently five logistics concepts, which are also called PartyLogistic:
1) 1PL (First Party Logistic) - Autonomous logistics. This technology was formed back in the 70s-80s of the XX century. Its peculiarity lies in the fact that the cargo owner himself performs all the logistics operations.
2) 2PL (Second Party Logistic) - Traditional logistics. This is a partial outsourcing, in which the company takes on only a part of the logistics functions, such as planning, warehousing and the formation of supply chains, resorting to using a transport company, since it does not have the necessary own transport.
3) 3PL (Third Party Logistic) - Complex logistics outsourcing. 3PL is a system when a company for the most part or completely shifts external logistics operations to another company that will deal with this. The range of

services of a company that deals with logistics operations includes: transportation, warehousing, packaging and forwarding of goods. 3PL is used mainly by contracting companies that provide logistics and cargo transportation services.

4) 4PL (Fourth Party Logistic) - integrated logistics outsourcing. 4PL is a service where a manufacturer engages another company that will deal with full logistics, plan and design supply chains, and also transfer to it the capabilities to manage the logistics business processes of the enterprise. 4PL is used by such companies as: Toshiba, Sony, Ford and many other major companies.

5) 5PL (Fifth Party Logistic) - "virtual logistics". When a 4PL company has an opportunity to provide network business services, it becomes a 5PL company. These companies using the global information technology space are able to provide a full range of services. Striking examples are Amazon, eBay, Aliexpress (Official site of visa and transport data, 2018).

In Western countries, a classification has long been adopted, according to which 5 levels of logistics service are distinguished. The differences between them lie in the set and features of the provision of services, the level of technologies and tools used (Table 2).

Table 2. Classification levels of logistics services

Service	1PL	2PL	3PL	4PL	5PL
Service planning					+
Purchase of goods				+	+
Pick up the cargo from the supplier		+	+	+	+
Warehouse provision		+	+	+	+
Preparation of permits			+	+	+
Preparation of documents for customs			+	+	+
Calculation and payment of customs duties			+	+	+
Passage of customs clearance of cargo			+	+	+
Delivery of goods to the specified address	+	+	+	+	+

Source: compiled by authors

Continuous improvement of technological processes and the search for new opportunities make logistics more advanced and modern, as well as the possibility of designing and evaluating the effectiveness of a macrologistic system.

The selection is made by defining a number of criteria and their specific combination. The most demanded qualities of services in logistics companies are the following (Figure 3).

In modern conditions, the development and implementation of a strategy for the development of logistics companies using design methods and based on this forecasting methods is the most important condition for increasing the efficiency of their activities, competitiveness and sustainability in the dynamically growing economic environment of the market.

Efficient logistics can help reduce sales costs, but the weakest link in supply chains is the strength. Developing countries need to improve their infrastructure, customs system, skills and regulatory frameworks to bring logistics efficiency up to par.
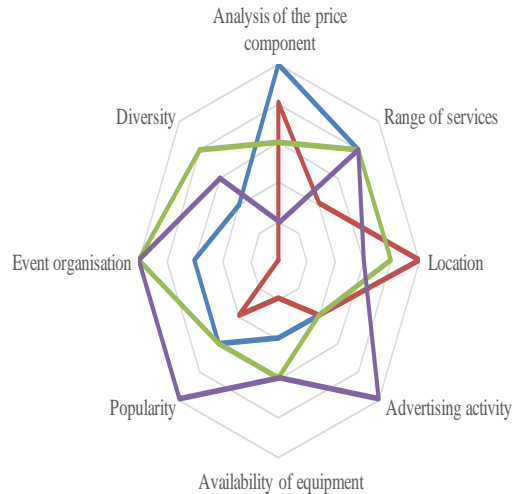
Figure 3. The most demanded quality of services of logistics companies by customers
Source: compiled by authors

The efficiency of supply chains that provide access for logistics systems of developing countries to national and international markets depends on a number of factors, which, first of all, include the sustainability of supply chains, their impact on the environment and the need for skilled workers. Particular attention should be paid to the problems faced by macrological systems of countries with developing economies:

1. Both developed and developing countries face the problem of labor shortages in the field of logistics. Developing countries need more executive managers, while developed countries face labor shortages.

2. Compared to low-income countries, high-income countries are much more likely to seek to improve their cyber preparedness.

3. High-income countries are much more likely to demand environmentally friendly logistics services than low-income countries. This is important because CO_2 emissions from vehicles are a significant source of environmental pollution.

Thus, examining the problems faced by the macrological systems of countries with developing economies, we can say that a macrological system is a large material flow management system that functions over several enterprises or firms and unites dissimilar production and trade enterprises, transport and others to achieve a single goal of intermediary firms. A systematic and comprehensive analysis of the macrological system will allow us to trace the tendency of its change, the achievement of planned and actual results of the indicator, and also will allow us to find out the trends in the change in the cost of a unit of transport services, fulfillment of the plan by its level, and reduce costs. To determine the influence of various factors on the change in the cost of logistics services, to establish reserves and assess the work of logistics companies in using the possibilities of reducing the cost of production, visualization of the relationship of production processes aimed at increasing economic efficiency and help to optimize logistics companies.

The use of information technology in logistics allows us to solve a whole range of tasks with minimal costs, which encourages the development of information products, relying on the most unexpected and original ideas.

As part of modern transformations in the economic and social life of individual states, a global consumer society is being formed, in which the interests of consumers of goods and services occupy the main place in the market, where manufacturers, suppliers and sellers in such a market are obliged to satisfy the needs and requests of buyers in the shortest possible time.

Such interconnection and interaction can be achieved with the help of well-functioning logistics that ensures the efficient use of time, financial and material resources in the production and consumption of goods and services. This is evidenced by data on the number of global mergers and acquisitions in the transport and logistics industry for the period from 2013-2017, with an upward trend by 2020 (Figure 4).
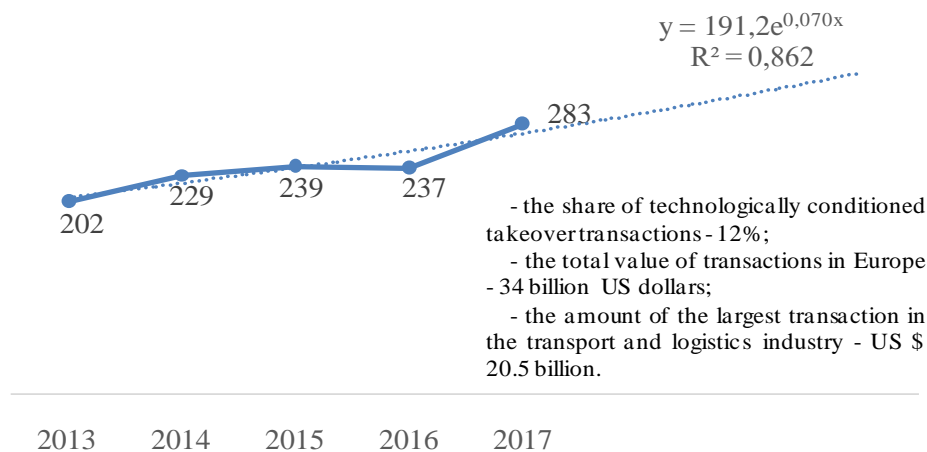

$$y = 191{,}2e^{0{,}070x}$$
$$R^2 = 0{,}862$$

283

- the share of technologically conditioned takeover transactions - 12%;
- the total value of transactions in Europe - 34 billion US dollars;
- the amount of the largest transaction in the transport and logistics industry - US $ 20.5 billion.

229   239   237

202

2013   2014   2015   2016   2017

Figure 4. The number of global M&A transactions in the transport and logistics industry for the period from 2013-2017, with an upward trend by 2020
Source: compiled by authors according to PwC Transport and Logistics Practice Report in Central and Eastern Europe

Assessing the effectiveness of macrological systems for countries with developing economies, we note that in 2020 the number of countries that fall into the category of "developing" reached 132. All of them occupy a special place in the world economy, are in different ways connected with capitalist countries, the world economic system and market. Because of this, a multi-structured economy has long been formed in such states, depending on developed and advanced countries.

But the situation that developed at the beginning of 2020, due to the pandemic, which caused negative changes in the entire global economy, led to the fact that the market of transport and logistics services is currently experiencing ups and downs: there has been an adaptation to the sanctions regime, prices for oil and the national currency rate (Bykova, Pustokhina, 2020).

To transform the market of transport and logistics services, due to its underdevelopment, mechanisms are needed to increase the competitiveness of logistics companies and maneuver in a crisis and political tension (Repnikova, Bykova, Skryabin, Morkovkin, Noval, 2019).

The World Bank classifies countries as developing countries with low and middle income (low and middle income). Income is measured by gross national income (GNI) per capita in US dollars. Low income is $ 1.045 or less, medium income is $ 1.045 to $ 12.746.

The International Monetary Fund classifies countries into advanced countries and developing countries. As a criterion, the level of per capita income, export diversification, and the degree of integration into the world financial system are used.

Consider the rating of the EAEU member countries by logistics efficiency sub-indices among the CIS countries in 2008-2018, which looks like this (Table 3).

Table 3. Rating of the EAEU member countries by logistics efficiency sub-indices among the CIS countries in 2008-2018

Country	Year	Subindex LPI					
		Efficiency of the customs clearance process	Quality of trade and transport infrastructure	Ease of organizing international supply of goods	Quality of logistics services	Cargo tracking	Compliance with the terms of delivery of goods
Kazakhstan	2008	50	54	127	120	66	78
	2010	79	57	29	73	85	86
	2012	73	79	92	74	70	132
	2014	121	106	100	83	81	69
	2016	86	65	82	92	71	92
	2018	65	81	84	90	83	50
Belarus	2008	112	92	134	85	109	78
	2010	50	54	126	120	66	78
	2012	121	65	107	89	98	114
	2014	87	86	91	116	113	93
	2016	136	135	92	125	134	96
	2018	112	92	134	85	109	78
Russia	2008	121	65	107	89	98	114
	2010	115	83	96	88	97	88
	2012	138	97	106	92	79	94
	2014	133	77	102	80	79	84
	2016	141	94	115	72	90	87
	2018	97	61	96	71	97	66
Armenia	2008	65	92	79	67	96	85
	2010	70	97	83	71	102	92
	2012	73	104	89	74	109	94
	2014	75	107	90	79	114	98
	2016	148	122	16	137	147	139
	2018	81	86	95	97	113	111
Kyrgyzstan	2008	128	126	114	137	129	131
	2010	139	135	118	145	135	141
	2012	143	142	123	148	138	148
	2014	145	147	127	151	145	155
	2016	156	150	152	151	115	126
	2018	155	103	138	114	99	106

Source: compiled by authors according to the source of Eurostat statistics www.eurostatica.com

Based on the values of the LPI logistics development indicator in 2018, Kazakhstan has the most developed logistics system among the EAEU member states, and Belarus and Kyrgyzstan have the least efficient ones.

According to the LPI 2018 rating, among the EAEU member states, Kazakhstan has the best indicators in the logistics sector: 84th in the subindex "ease of organizing international deliveries of goods", 83rd - tracking the passage of goods, 50th - "meeting deadlines delivery of goods".
The state of the logistics system of the Republic of Belarus is affected by insufficient investment in this sector. In order to improve the situation, a set of measures should be implemented in Belarus both in the field of improving the logistics infrastructure and searching for new approaches to management, and in the field of automation of logistics processes.

Investigating foreign indicators, Western Europe and developed Asian regions occupy a confident leadership in terms of logistics development (Official site of World Bank, 2019). Among European countries, according to the LPI 2018 ranking, indicators in the logistics sector are occupied by the following countries for the period from 2008 to 2018 (Table 4).

Table 4. Indicators in the logistics sector among developing countries of Europe according to the LPI 2018 ranking for the period from 2008 to 2018

Country	2008		2010		2012		2014		2016		2018	
	Index LPI	Place in Rating LPI	Index LPI	Place in Rating LPI	Index LPI	Place in Rating LPI	Index LPI	Place in Rating LPI	Index LPI	Place in Rating LPI	Index LPI	Place in Rating LPI
Poland	3,04	40	3,44	30	3,43	30	3,49	31	3,34	33	3,54	28
Estonia	2,95	47	3,16	43	2,86	65	3,35	39	3,36	38	3,31	36
Lithuania	2,78	58	3,13	45	2,95	58	3,18	46	3,36	29	3,02	54
Latvia	3,02	42	3,25	37	2,78	76	3,4	36	3,33	43	2,81	70
Moldova	2,31	106	2,57	104	2,33	132	2,65	94	2,61	93	2,46	116
Ukraine	2,55	73	2,57	102	2,85	66	2,98	61	2,74	80	2,83	66

Source: compiled by authors according to the source of Eurostat statistics www.eurostatica.com

In order to bring logistics efficiency up to par, international experts recommended that developing countries improve their infrastructure, customs system, professional skills and regulatory framework. But in order to identify these criteria for the efficiency of logistics in developing countries, the author examined the monthly indicators of exports and imports using the example of road freight transportation among the CIS countries for 2017-2019 (Table 5).

Table 5. Indicators of export and import of road freight transportation of the CIS countries for 2017-2019

(tons)

Month	Export			Import		
	2017	2018	2019	2017	2018	2019
Russia						
January	677182	712823	787786	698465	771151	765893
February	754846	794575	887287	798905	823994	823599
March	848981	893664	1074552	879366	905264	876603
April	935232	984455	1040574	869254	878481	882853

May	889835	936668	954788	901867	935333	883421
June	902068	949545	843963	889176	914528	853635
July	969837	1020883	975106	902004	902004	958343
August	928625	977501	902890	898679	898638	903284
September	893922	940971	908831	814028	835823	911075
October	102403	1077940	1012707	916837	961215	1034072
November	90720	954990	916389	918672	959392	964403
December	828689	872305	831554	702498	723749	761391
Belarus					
January	354759	372780	430409	152987	165451	173575
February	329783	356933	424799	167109	182764	188152
March	361297	371639	459662	204928	212790	215343
April	352966	374460	460332	171958	188559	212070
May	404198	417104	456868	179287	188559	198956
June	405029	409757	406469	182495	197225	176339
July	412049	420178	467365	162108	174160	183435
August	417398	426066	430319	158109	162898	164322
September	406938	413337	445971	136287	148347	165251
October	475198	496212	454563	171308	180440	190495
November	442109	463088	408227	172109	188743	197823
December	346938	367675	346497	180157	195177	193609
Kazakhstan					
January	13124	19327	33700	34619	34619	38515
February	14946	19517	34328	41089	39458	55843
March	15075	23167	35592	64835	55424	60379
April	14397	20970	28439	58745	54766	67629
May	17348	19343	28846	60824	53268	66612
June	15627	17729	19354	59867	50870	51024
July	15969	15940	17356	43494	43496	50072
August	16296	14126	14258	41365	43369	47278
September	15091	13093	13146	37023	38023	45151
October	17492	21167	22920	51288	51288	54457
November	18397	25224	24016	49329	46881	51910
December	15017	25385	22185	39879	41050	45590
Ukraine					
January	381935	471895	467749	310207	388907	403005
February	490144	491952	519714	400025	420173	462856
March	493809	493809	534177	501521	466144	519316
April	490114	485817	521443	401253	433871	527224
May	505187	545811	586130	432286	470287	519728
June	490183	518096	492974	432286	481190	479909
July	485152	544654	598473	428725	493267	555809
August	472185	529628	496320	438912	522966	525896
September	483196	518973	534931	428286	479932	523935
October	522048	552048	510739	438912	517078	562275
November	491912	521912	465680	428041	67919	508889
December	390120	400120	410424	400031	386860	441141

Source: Source: compiled by authors according to the source of Eurostat statistics www.eurostatica.com

According to the data presented in table 5, the situation is as follows:
1 Kazakhstan
In 2019, 634 thousand tons of cargo were transported from the European Union to Kazakhstan by road, which is 14.8% more than in 2018. The increase in physical terms amounted to 82 thousand tons.

In 2019, 294 thousand tons of cargo were transported from Kazakhstan to the European Union by road, which is 24.5% more than in 2018.

2 Belarus

In 2019, 2,259.4 thousand tons of cargo were transported from the European Union to the Republic of Belarus by road, which is 3.6% more than in 2018. The increase in physical terms amounted to 77.7 thousand tons.

It should be noted that this is a significant reversal of the trend, since in 2018, compared to 2017, import road freight traffic from the EU to the Republic of Belarus decreased by 17%.

In 2019, 5191.5 thousand tons of cargo were transported from Belarus to the European Union by road, which is 6.3% more than in 2018.

In terms of countries, the largest increase in freight traffic in physical terms (tons) occurred in the direction of Lithuania, Poland and Latvia. Exports in physical terms decreased most of all to Germany.

3 Russia

In 2019, 10,610 thousand tons of cargo were transported from the European Union to the Russian Federation by road, which is 1.2% more than in 2018. The increase in physical terms amounted to 125.8 thousand tons. The positive dynamics at the end of the year was due to the growth in traffic in the second half of the year. In terms of countries, the largest increase in road transport in the Russian Federation in physical terms (tons) is noted from Poland, Finland, Italy, Hungary, Estonia. Freight traffic from Germany, the Netherlands and Romania has significantly decreased.

In 2019, 11,136.4 thousand tons of cargo were transported from Russia to the European Union by road, which practically corresponds to the level of 2018 (+ 0.15%). As a reminder, in 2018, the positive dynamics of exports was 12%). In terms of countries, the largest decrease in freight traffic in physical terms (tons) occurred in the direction of Hungary and Germany. Exports in physical terms increased most of all to Finland and Poland.

4 Ukraine

In 2019, 6,030 thousand tons of cargo were transported from the European Union to Ukraine by road, which is 9.3% more than in 2018. The increase in physical terms amounted to 511 thousand tons.

The increase in imports occurred from almost all EU countries (with the exception of the UK and Croatia), but the most significant increase in road transport to Ukraine in physical terms (tons) came from Poland (+288 thousand tons).

In 2019, 6139 thousand tons of cargo were transported from Ukraine to the European Union by road, which is 1.1% more than in 2018. The positive dynamics decreased due to the reduction in traffic in the second half of the year.

In terms of countries, the largest increase in freight traffic in physical terms (tons) occurred in the direction of the Netherlands, Bulgaria, Lithuania. Exports in physical terms decreased most of all to Germany, Hungary, Romania. In the context of cargoes from Ukraine to the EU by road transport in the export cargo traffic, the largest increase in the volume of animal and vegetable fats, household goods, glass and glass products, food industry waste and animal feed. There was a decrease in the export road transport of wood and wood products, iron and steel products, aluminum and products from it, and sugar.

Graphical analysis indicates the influence of seasonal factors on the dynamics of changes in the indicators under consideration (Figure 5,6).
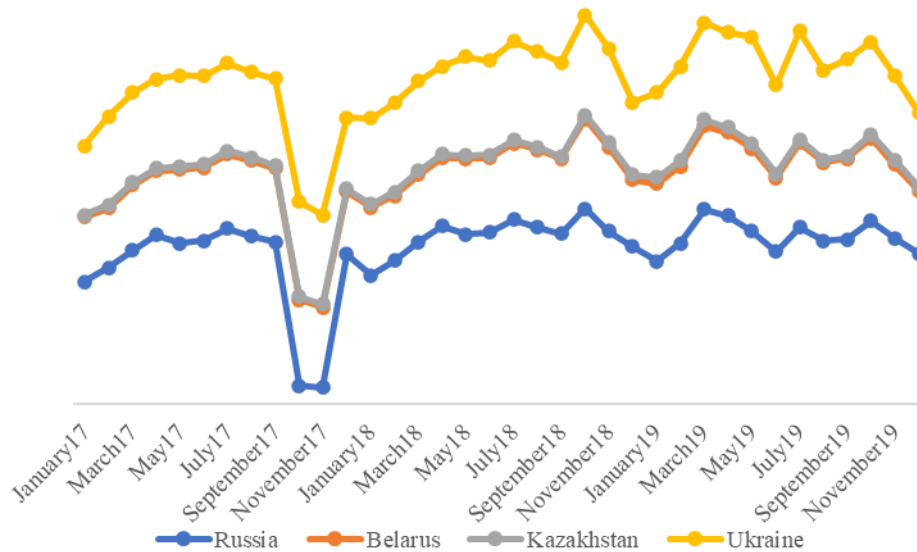
Figure 5. Dynamics of the export of road freight
for 2017-2019 among the CIS countries, in tons
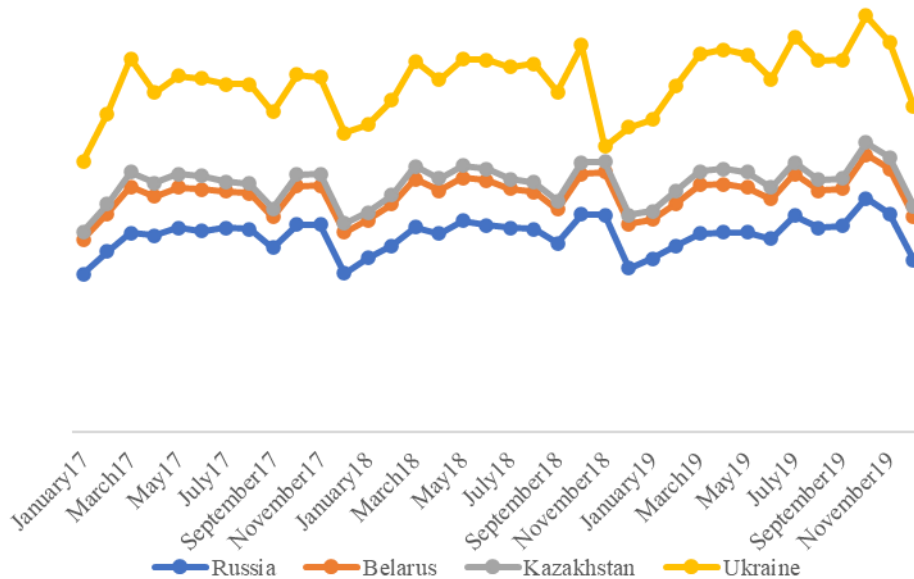*Source:* compiled by authors according to www.eurostatica.com

Figure 6. Dynamics of imports of road freight
for 2017-2019 among the CIS countries, in tons
Source: compiled by authors according to Eurostat statistics www.eurostatica.com

5. Analysis and application functionality

As a result, to construct a forecast, it is advisable to use trend-seasonal models. The amplitude of seasonal fluctuations in our case is constant, therefore an additive model was used for the forecast, which is built by adding the components.

In our case, the equation of the time series, taking into account seasonal fluctuations, is represented by the formula:

$$Y=T+S+E, \qquad\qquad (1)$$

Where:
Y – time series level,
T – trend component,
S – seasonal component,
E – random component.

The construction of an additive model is reduced to calculating the values of T, S and E based on actual indicators for the previous period, namely, monthly indicators of the volume of exports and imports of road freight for 2017-2019.

The forecasting process includes the following steps:
1) Aligning the original series using the moving average method.
2) Calculation of the values of the seasonal component S.
3) Elimination of the seasonal component S from the initial levels of the series and obtaining the aligned data (T + E).
4) Analytical alignment of levels (T + E) and calculation of T values using the obtained linear trend equation.
5) Estimation of the absolute error to determine the degree of conformity of the model to the original data.
6) Building a forecast based on seasonal fluctuations (Hayaloglu, 2015).

The results of trend-seasonal modeling for the considered indicators are presented in Table 6.

The forecast values of the volumes of exports and imports of road freight transportation for 2021 are determined as the sum of the trend T and the corresponding seasonal S component (Table 7).

Table 6. Results of trend-seasonal modeling for the indicators of export and import of road freight transportation

Index	Trending component	Monthly seasonal components			
Russia					
Export	$T = 873948,10 + 2028,62t$	$S_1= -181395,25$	$S_2= -90342,37$	$S_3=53060,17$	$S_4=81391,96$
		$S_5= 14649,92$	$S_6=-34575,20$	$S_7=85666,02$	$S_8=38305,59$
		$S_9=-4769,50$	$S_{10}=121874,98$	$S_{11}=-1562,83$	$S_{12}=-82303,50$
Absolute error	$R^2=0,81$	Model explains 81% of total time series variation			
Import	$T = 838923,02 + 1676,68t$	$S_1=-92898,63$	$S_2=-38893,80$	$S_3=26125,45$	$S_4=11394,74$
		$S_5=36709,62$	$S_6=9234,45$	$S_7=42392,81$	$S_8=37128,10$
		$S_9=-37061,80$	$S_{10}=76812,95$	$S_{11}=76919,93$	$S_{12}=-147863,84$
Absolute error	$R^2=0,89$	Model explains 89% of total time series variation			
Belarus					
Export	$T = 381586,28 + 1579,98t$	$S_1=-19666,90$	$S_2=-31817,00$	$S_3=-8114,88$	$S_4=-6752,67$
		$S_5=13973,10$	$S_6=-14184,84$	$S_7=12366,27$	$S_8=14429,23$
		$S_9=-1194,04$	$S_{10}=70087,39$	$S_{11}=33646,81$	$S_{12}=-62772,48$
Absolute error	$R^2=0,72$	Модель объясняет 72% общей вариации временного ряда			
Import	$T = 165602,18 + 783,25t$	$S_1=-11065,19$	$S_2=4306,06$	$S_3=32181,70$	$S_4=17426,56$
		$S_5=9934,12$	$S_6=2142,66$	$S_7=-8025,84$	$S_8=-16523,65$
		$S_9=-35365,52$	$S_{10}=-2861,17$	$S_{11}=445,39$	$S_{12}=7404,87$

Absolute error	$R^2=0,89$	Model explains 89% of total time series variation			
	Kazakhstan				
Export	$T = 12975,40 + 376,57t$	$S_1=4411,98$	$S_2=4834,54$	$S_3=7374,52$	$S_4=2626,96$
		$S_5=1786,81$	$S_6=-4032,58$	$S_7=-2807,54$	$S_8=-4383,50$
		$S_9=-6333,73$	$S_{10}=-1816,21$	$S_{11}=132,71$	$S_{12}=-1793,98$
Absolute error	$R^2=0,74$	Model explains 74% of total time series variation			
Import	$T = 45808,82 + 180,50t$	$S_1=-11397,34$	$S_2=-574,07$	$S_3=9384,41$	$S_4=12445,06$
		$S_5=11067,77$	$S_6=1902,02$	$S_7=-3579,17$	$S_8=-5095,71$
		$S_9=-10154,26$	$S_{10}=3518,49$	$S_{11}=29,83$	$S_{12}=-7547,03$
Absolute error	$R^2=0,82$	Model explains 82% of total time series variation			
	Ukraine				
Export	$T = 471008,39 + 1431,16t$	$S_1=-33650,42$	$S_2=-503,09$	$S_3=6076,29$	$S_4=-5128,92$
		$S_5=57993,69$	$S_6=-2318,31$	$S_7=23287,60$	$S_8=6887,27$
		$S_9=5608,23$	$S_{10}=40078,04$	$S_{11}=7603,04$	$S_{12}=-105933,42$
Absolute error	$R^2=0,75$	Model explains 75% of total time series variation			
Import	$T = 399296,97 + 3367,69t$	$S_1=-63881,43$	$S_2=-22782,68$	$S_3=24627,97$	$S_4=7882,72$
		$S_5=18088,32$	$S_6=1089,53$	$S_7=19975,36$	$S_8=36676,09$
		$S_9=8166,39$	$S_{10}=29057,26$	$S_{11}=3852,66$	$S_{12}=-62752,20$
Absolute error	$R^2=0,86$	Model explains 86% of total time series variation			

Source: compiled and calculated by authors

Table 7. Forecasted values of export and import indicators of road freight for 2021

(tons)

Month	Export				Import			
	Russia	Belarus	Kazakhstan	Ukraine	Russia	Belarus	Kazakhstan	Ukraine
January	791955,35	439338,35	35839,08	507484,77	828181,52	192916,38	43255,87	500432,53
February	885036,85	428768,22	36638,21	542063,27	883863,03	209070,88	54259,63	544898,98
March	1030468,01	454050,33	39554,76	550073,80	950558,95	237729,78	64398,61	595677,31
April	1060828,43	456992,51	35183,76	540299,75	937504,92	223757,89	67639,75	582299,76
May	996115,01	479298,26	34720,18	604853,51	964496,47	217048,70	66442,96	595873,06
June	948918,50	452720,30	29277,35	545972,67	938697,98	210040,50	57457,71	582241,96
July	1071188,36	480851,39	30878,95	573009,75	973533,01	200655,25	52157,02	604495,48
August	1025856,54	484494,32	29679,56	558040,58	969944,98	192940,69	50820,97	624563,91
September	984810,08	470451,03	28105,90	558192,69	897431,76	174882,07	45942,93	599421,89
October	1113483,18	543312,45	32999,98	594093,67	1012983,19	208169,68	59796,18	623680,46
November	992073,99	508451,84	35325,47	563049,82	1014766,84	212259,49	56488,01	601843,55
December	913361,95	413612,53	33775,34	450944,53	791659,75	220002,22	49091,65	538606,39

Source: compiled and calculated by authors

Graphically, the forecasted values of the indicators of export and import of road cargo transportation for 2021 among the CIS countries are as follows (Figure 7,8).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
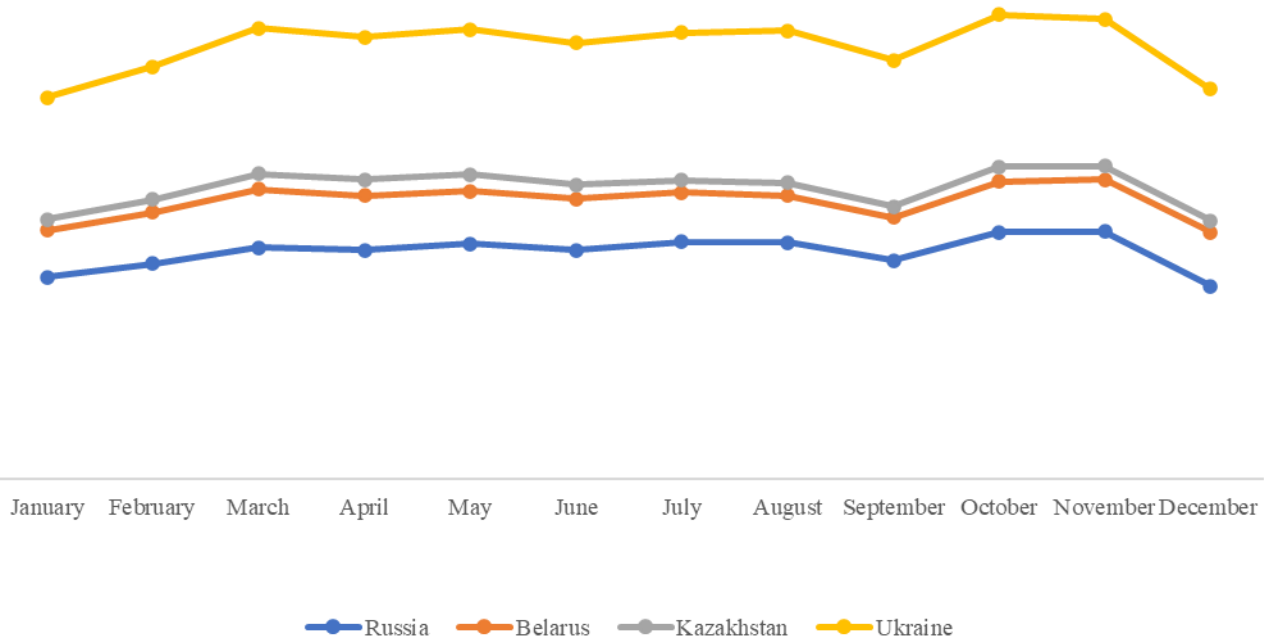

Figure 7. Forecasted values of indicators of imports of road freight for 2021 among the CIS countries
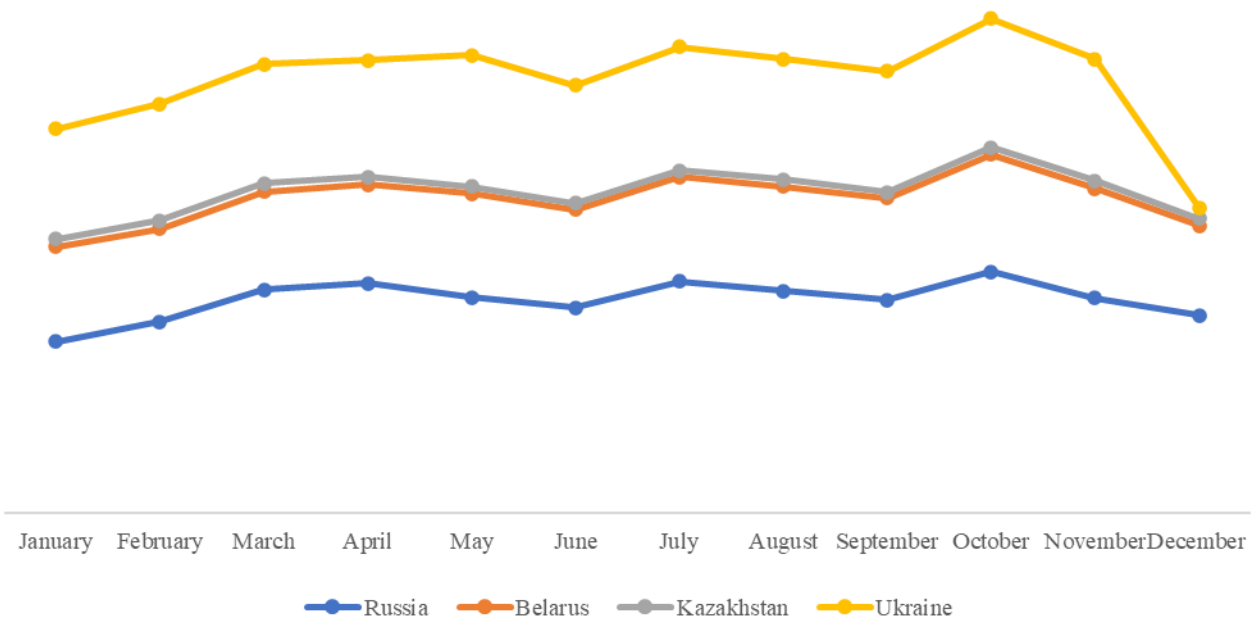*Source:* compiled and calculated by authors

Figure 8. Forecasted values of export indicators for road freight for 2021 among the CIS countries
Source: compiled and calculated by authors

The obtained forecast indicators for the export and import of road freight for 2021 among the CIS countries indicate that the most stable dynamics is observed in Kazakhstan, while in other countries - Ukraine, Russia, Belarus, there is a certain decline. Although the indices of imports and exports in Kazakhstan are much lower, perhaps in other CIS countries. This allows us to draw conclusions that it is necessary to increase the volume of export of road freight in Kazakhstan.

6. Conclusion

The global trends of global world economic development indicate that the formation of markets for needs leads not only to the development of the market of producers. The consequence of this process, under the influence of a number of reasons and factors, is the development of logistics and logistics systems in general.
The development of logistics and its investment is carried out in various countries according to individual scenarios, as shown to us by the forecast values of exports and imports of road cargo transportation among the CIS countries, adjusted for the peculiarities of national economic policy, geographic, demographic characteristics, urbanization and the level of development of the general infrastructure of specific regions. A common feature of the logistics systems of developed European, American and Asian markets is an orientation towards modernization through the introduction of modern information technologies and an expansion of the range of IT services.

Focusing on the processes of functioning of logistics systems and supply chains of industrial enterprises, it is important to note that due to the circumstances of the development and dissemination of information technologies within the framework of the digitalization of the economy, new opportunities open up for the exchange of information between individual production, logistics and auxiliary systems and their elements, as well as produced and serviced. within the latest products and the external environment. From the standpoint of business, logistics is an integral management tool that contributes to the achievement of strategic, tactical or operational goals of its organization through effective (in terms of reducing overall costs and meeting the requirements of end users for the quality of products and services) management of material flows, service flows, and related them flows of information and finance.

Thus, in modern conditions, logistics and logistics systems are becoming important elements of the development potential of a market economy in any country, an important production segment of the economy. Logistics is more and more clearly outlining its specific role as an energetic locomotive that drives the transport conveyor for the supply of services, the transportation of goods, the organization of flows in the production of products, thereby ensuring progress towards achieving the goals of increasing the well-being of all citizens, national and economic independence.

Summing up, it should be noted that increasing competitiveness in the transport and logistics sector is always a set of measures, including the development of the material and technical base of the transport system, and the improvement of technologies with a regulatory and legal framework, as well as the development of human potential. These areas are appropriately assessed in the annual DOMESTIC LPI survey, and deserve maximum attention and decisive action from the involved government authorities and representatives of the transport business. The information obtained as a result of the study signals the presence of certain barriers hindering the development of the country's transport and logistics complex, noted by more general trends in the World Bank's LPI-2018 report. Developing economies face a wider range of transport logistics challenges that need to be addressed. An effective tool in this regard can be the adoption of a state strategy for the development of transport logistics based on positive international experience.

References

Adeniran, A.O., Obembe, O.E. 2020. The significance of strategic management accounting on the performance of transport businesses in Nigeria. Insights into Regional Development, 2(3), 677-688. https://doi.org/10.9770/IRD.2020.2.3(5)

Alekseycheva, E. 2015. The main ways and factors of increasing the competitiveness of industrial enterprises in Russia. Bulletin TISBI, 2 (9), 31-38.

Anikin, B. 2016. Logistics. Moscow: INFRA-M, 368 p.

Adamczak, M., Domanski, R., Hadas, L., Cyplik, P. 2016. The integration between production-logistics system and its task environment – chosen aspects. IFAC-PapersOnLine, 49(12), 656–661. https://doi.org/10.1016/j.ifacol.2016.07.771

Bykova, O., Pustokhina, I. 2020. Challenges and prospects for the development of the market of transport and logistics services. Economics, Entrepreneurship and Law, 1 (10), 63-70.

Cyplic, P., Hadas, L., Adamczak, M., Domanski, R., Kupczyk, M., Pruska, Z. 2014. Measuring the level of integration in sustainable supply chain. Proc. of the 19th World Congress the International Federation of Automatic Control. Cape Town, South Africa, 4465–4470. https://www.produccioncientificaluz.org/index.php/opcion/article/viewFile/30390/31440

Damdyn, O. 2015. Transport logistics. Young scientist, 12 (24), 117-122.

Dolgov, A. 2016. Global logistics: the problem of assessing the level of development and international comparisons. Logistics today, 5 (41), 201-210.

Dolgov, A. 2015. Stocks and logistics processes in macroeconomic processes. SPb.: Publishing house of SPbGUEF, 240 p.

Dybskaya, V. 2015. Warehousing logistics for practitioners. Moscow: Alfa-Press, 208 p.

Gabbasova, V. 2016. Logistic system. Young scientist, 15(119), 281-283

Galstyan, B. 2018. Transport logistics, its essence and tasks. Young scientist, 51 (237), 224-225.

Greenwald, D. 1973. The McGraw-Hill Dictionary of Modern Economies. A Handbook of Terms and Organizations. N.Y., 215p.

Gadzhinsky, A. 2018. Methods and models of logistics: study guide. Allowance. Yekaterinburg: UrGUPS, 166 p.

Gutthorna, J. 2018. Supply Chain Management. Moscow: INFRA-M, 670 p.

Gvilia, N., Parfenov, A., Shulzhenko, T. 2019. Management of integrated intercorporate logistics systems in the digital economy. Manager, 1(10), 40-51. https://doi.org/10.29141/2218-5003-2019-10-1-4

Hayaloglu, P. 2015. The Impact of Developments in the Logistics Sector on Economic Growth: The Case of OECD Countries. International Journal of Economics and Financial Issues, 5(2), 523-530.

Jiao, R., Zhao, G.S., Wang F. 2019. Logistics Service Standardization, Enterprise Operation Efficiency, and Economic Effects", Transformations in Business & Economics, Vol. 18, No 3(48), 168-190.

Kurenkov, P. 2016. Private car parks and problems of railway infrastructure development. Transport Bulletin, 4 (11), 10-17.

Kayikci, Y. 2018. Sustainability impact of digitization in logistics. Procedia Manufacturing, 21 (42), 782–789.

Levkin, G. 2019. Logistics. Moscow: Direct-Media, 281 p.

Lukinsky, V. 2017. Models and methods of the theory of logistics. SPb.: Peter, 176 p.

Lukinskiya, V., Lukinskiya, V. Shulzhenko, T. 2017. Logistic Systems Efficiency Increase Based on the Supply Chains Integration. Procedia Engineering, 19 (178), 117–122. http://dx.doi.org/10.1016/j.proeng.2017.01.073

Mader Michelle, M., & Suski Cássio, A. (2019). Study of the effect of the Dienitro additive on the NOx and CO emissions in buses of collective transport to Diesel S-50 EGR and S-10 with SCR and EGR systems. Management of Environmental Quality: An International Journal, 31(3), 625-644.
https://www.emerald.com/insight/content/doi/10.1108/MEQ-07-2019-0158/full/html

Mirotin, L., Levin, B. 2015. Innovative processes of logistics management in intelligent transport systems. Moscow: Educational and methodological center for education in railway transport, 499 p.

Myasnikova, L. 2016. Modern problems of logistics management. SPb.: St. Petersburg State University of Economics, 152 p.

Mortansen, O., Lemoine, O. 2008. Integration between Manufacturers and third party logistics providers? International Journal of operations and Production Management, 28(4), 331–359. https://doi.org/10.1108/01443570810861552

Official site of visa and transport data. 2018. https://visasam.ru/emigration/vybor/ razvivayushchiesya-strany.html

Official site of PwC Transport and Logistics Practice Report in Central and Eastern Europe. 2018. http://www.pwc.ru

Official site of World Bank. International logistics Performance Index. 2019. https://lpi.worldbank.org/international/global

Official site of Euro Statica. 2018. Electronic resource. http://eurostatica.com

Prokofieva, T., Lopatkin, O. 2017. Logistics of transport and distribution systems: regional aspect. M.: RKconsult, 400 p.

Rostow, W. 1960. The stages of Economic Growth. N.Y., 112 p.

Repnikova, V., Bykova, O., Skryabin, O., Morkovkin, D., Novak L. 2019. Strategic aspects of innovative development of entrepreneurial entities in modern conditions. International Journal, 4(11), 32-35.

Rivera, L., Sheffi, Y., Knoppen, D. 2016. Logistics clusters: The impact of further agglomeration, training and firm size on collaboration and value added services. International Journal of Production Economics, 96 (179), 285–294. https://doi.org/10.1016/j.ijpe.2016.05.018

Stanton, W. 1978. Fundamentais of Marketing. N.Y., 314p.

Sergeev, V., Zinina, D. 2016. Analysis of existing international approaches to assessing the effectiveness of logistics. Logistics and supply chain management, 2 (11), 4-19.

Shcherbakov, V. 2018. Basics of logistics. SPb.: Peter, 432 p.

Wong, C., Boonitt, S., Wong, C. 2011. The contingency effects of environmental uncertainty on the relationship between supply chain integration and operational performance. Journal of Operations Management, 9(6), 604–615. http://dx.doi.org/10.1016/j.jom.2011.01.003

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Yerlan KUNYAZOV is PhD student of S. Toraighyrov Pavlodar State University, Pavlodar, Kazakhstan. Research interests: economy, ecenomic development, logistic system, investments.
ORCID ID: orcid.org/0000-0002-0504-2010

Yertargyn SHAKHMAN is Prorector of S. Toraighyrov Pavlodar State University, Pavlodar, Kazakhstan. Research interests: bank lending, monetary policy; financial support for small and medium-sized businesses, sources of financing for the innovation sector
ORCID ID: orcid.org/0000-0002-0457-2247

Saule RAKHIMOVA is Candidate of Economic Sciences, Professor of S. Toraighyrov Pavlodar State University, Pavlodar, Kazakhstan. Research interests: housing financing, development of mortgage lending, investments, banking system problems
ORCID ID: orcid.org/0000-0003-0553-9606

Alma MUSSINA is Candidate of Economic Sciences, Professor of S. Toraighyrov Pavlodar State University, Pavlodar, Kazakhstan. Research interests: housing financing, development of mortgage lending, investments, banking system problems
ORCID ID: orcid.org/0000-0002-3893-316X

Takhir ERNAZAROV is Professor of Karaganda Economic University of S. Toraighyrov Pavlodar State University, Pavlodar, Kazakhstan. Research interests: finance, insurance, banks.
ORCID ID: orcid.org/0000-0002-9357-0103

_____

ECONOMIC STRATEGY OF DIVERSIFICATION OF ENTERPRISE ACTIVITIES UNDER CONDITIONS OF GLOBALIZATION

Mergul Chemirbayeva [1], Zhanat Malgarayeva [2], Almagul Azamatova [3]

[1,2,3] Narxoz University, Almaty, Kazakhstan

E-mails: [1]mergul.shemirbaeva@narxoz.kz; [2] zhanat.malgaraeva@narxoz.kz; [3]almagul.azamatova@narxoz.kz

Abstract. In modern conditions of globalization and economic integration, increased competition, instability of consumer demand, enterprises in order to ensure financial and economic stability and reduce commercial risks need to use modern development strategies and models of interaction with other market participants, which, in turn, requires improved management, mainly based on the priority of the production diversification strategy, since the diversification process is innovative, causing the use of systemic techniques and technologies of a new type, a new organization of labor and production. The article is devoted to the analysis of the economic strategy for diversifying the activities of light industry enterprises based on the implementation of innovative approaches to management, including organizational design, project management, costs, human capital, etc. The article shows that today there is no single strategy that can be used to ensure optimized performance and achieved competitive product prices.

Keywords: industry; light industry; cluster analysis; diversification; strategy; globalization; economic conditions; production volume

1. Introduction

In the present period, it becomes obvious that one of the components of the successful development of the country's light industry is the modernization orientation of the functioning of strategic mechanisms for managing the industry in order to ensure sustainable development and overcome macro- and microeconomic destabilizing factors. In these conditions, the solution of the country's most important social problems depends on the stable development of light industry.

The development of light industry should be built into the balanced growth of all branches of production of the country's industrial complex. To implement such a scenario, government support of industries is required. Due to the high rate of change in external factors that have a strong impact on the subjects of production and economic activity, especially in the WTO, light industry enterprises are faced with the task of ensuring the competitiveness of industrial enterprises in the international market.

A light industry enterprise should form its development strategies, taking into account the interests of the state, aimed at creating conditions that will result in a multi-branch, balanced, stable structure of industrial production. Currently, the priority areas in the development strategies of light industry enterprises are resource content and the final financial results without taking into account other factors that largely affect the achievement of the main development goals (Rajnoha, R., Lesnikova, P., Stefko, R., Schmidtova, J., Formanek, I. (2019); Mazzoni, F., 2020). To implement this path of development of light industry enterprises, it is necessary to have effective methods and tools to improve the development strategy of enterprises. In this regard, the need to conduct research aimed at improving the toolkit for forming a strategy for the development of light industry enterprises is of particular relevance.

At present, the domestic light industry provides domestic demand for no more than 10 percent. The state is creating conditions for the development of the industry; for this, the program "Business Roadmap - 2020" has been extended until 2025, for the implementation of which at least 30 billion tenge is allocated annually (Business Roadmap, 2020). Despite the existing problems in the industry related to the unloaded production capacities of enterprises, the lack of personnel, the lack of benefits and orders for light industry products within the country, the industry does not stand still (Official site of Tengrinews, 2019).

2. Research background

Considering the significant role of light industry in ensuring economic and strategic security, employment of the able-bodied population and raising its standard of living in the new geopolitical conditions, providing the necessary attention to the development of this industry and providing it with significant investment support, as the leading world countries do, is one of the strategic tasks state policy of the Republic of Kazakhstan.

Today Kazakhstan is at a stage of stable economic growth, the promising goal of which is the further integration of Kazakhstan into the world economic space. Textile and light industry is one of the main sectors of the economy that form the budget in many countries of the world (Brousek, 2018). The textile industry, as an ever-growing industry, is the focus of a whole cluster of studies: dedicated to building a circular or cyclical economy (Coste-Maniere, I., Croizet, E., Sette, K., Fanien A., Guezguez, H. 2018) devoted to studying the conditions for industrial development and building a circular economy to solve the problem of resource scarcity (Kumar, P., Carolin, C., 2018). In their publications, a number of authors Shevchenko I.K., Razvadovskaya Yu.V., Marchenko A.A. (2019) describe a multi-level analysis of the main economic indicators of the development of textile production, where the focus is on such indicators as capital-labor ratio, capital intensity of labor in textile production. The main directions of cluster development in the textile and light industry contributes not only to their rise in the management system of the industrial complex, but also helps to further modernize the economy as a whole. Dmitriev Yu.A., Petrukhin A.B., Shustrov L.I., Shustrov T. L. (2019) believe that a developed and highly productive system of cluster development in the industrial complex can become not only an effective mechanism for ensuring the progressive economic development of the state, but also an effective tool for transferring the country's economy to an innovative type of development. The garment industry is the oldest industrial sector with great potential and rich labor traditions. Such scientists-economists as I.F. Zhukovskaya, S.A. Trufanova, N.N.

Ivlieva (2020) devoted their research to the problems and ways of solving the enterprises of the domestic clothing industry, who proposed to apply a set of measures to stabilize production and gradually increase it: incentives, customs and tariff regulation and administrative measures.

Yusupov S. Sh., Yusupova D. T. (2020) in their studies describe the foreign experience in the development of the textile and light industry, which in the modern world occupies a high place among the industries involved in export. It has a wide range of exported goods - from yarn to finished products (clothing and knitwear). From this point of view, the export potential of the industry is huge, and its development can be selected from the conditions at the time of making a decision: the presence of a strategic investor, the world commodity market, the effectiveness of the current business plan, the level of staff readiness in accordance with the requirements of export products. As noted by E.V. Mozglyakova (2017), light industry is the most important diversified and innovatively attractive sector of the economy, providing strengthening of the country's defense capability, economic, social and intellectual security. Authors Ngai, E.T, Peng, S., Moon, K. (2014), researching the development strategies of the light industry, note that at the present stage of development of scientific developments and directions for introducing information technologies into the production process, innovative methods of dyeing and finishing fabrics, the use of digital methods color selection, automation of the product design process, the use of "artificial intelligence" in production is a prerequisite for the development of this industry in the context of digitalization and globalization of the economy. Other authors, such as Simay K. H., Deniz N. (2018), are inclined to the same opinion. They believe that increasing the science intensity of light industry is a necessary measure to resist the powerful competitive pressure from Asian manufacturers.

In this regard, the activities of organizational and production structures acquire new qualitative features and the need to improve planning and management of diversification processes.
The issues related to diversification have been considered by many scientists in their works. Thus, the first studies of diversification and integration were carried out by M. Gort in 1962 (in relation to American companies) and E. Yesinara in 1979 (in relation to Japanese companies). Development in the same direction was continued by such foreign authors as I. Ansoff (1989), A. Thompson, A. J. Strickland (1998) and others.

According to I. Ansoff (1989), early diversifications were associated with the criteria of synergy mainly with functional departments: marketing department, R&D, etc. Alas, practice has shown that the most basic criterion of synergy is the synergy of corporate governance:
1) increasing income and hedging risks;
2) availability of information support for corporate business and motivation for marketing research;
3) tax incentives;
4) technological gain due to the mutual penetration of technologies, joint research and development.
Thompson A.A., Strickland A.J. (1998) believe that the development of diversification of activities of industrial enterprises at the regional level is stimulated by the following main factors:
- systemic limitation of production concentration;
- reducing the risk from entrepreneurial activity by updating and expanding the range (assortment) of products;
- reducing the risk from structural changes and market fluctuations: the possibility of financing the reform of enterprises with a long cycle of capital turnover through production with a rapid turnover of capital;
- legal forms of control over the growth of horizontal and vertical integration of production.

The most complete definition of this concept was given by M.D. Korinko (2017), who considers diversification as an innovative process of diversified development of an economic entity through the redistribution of resources,

penetration into other areas of production and the markets of new goods and services in order to reduce risks and increase income.

M.D. Korinko (2017) notes that to assess the effectiveness of diversification, one can use indicators of enterprise activity (growth in sales, increase in market share, growth in sales income, etc.) or financial indicators (dividends, growth in the market value of shares, etc.)

The most promising approach was proposed by Poplavskaya, Zh. (2018) and others. These authors connect the diversification of the enterprise with the stages of the life cycle of the product (product) (Poplavskaya, Zh., 2018). Indeed, if you link the need for diversification with the stages of the product life cycle (for example, stages of growth and maturity), then you can get a fairly simple mechanism for determining the start time, direction and type of diversification of the enterprise.

According to research by A.S. Krasnikova, O.N. Melnikov, E.A. Starozhuk (2019) mechanism for coordinating the execution of tactical and strategic tasks of industrial enterprise subdivisions in the context of diversification is based on a flexible combination of modernized management principles for the formation of the staff of performers and the transition to strategic and tactical plans that take into account the characteristics of industrial enterprises to use the principles of diversification of production organization.

According to research by A.M. Bochkarev (2019), it is necessary to focus on the information support of industrial enterprises in the context of production diversification, where, among the tools for improving information support for the production activities of an industrial enterprise, the development and concretization of conceptual aspects and organizational and economic modeling, characterizing a new vision of the functioning of the information support system of production activities, taking into account the industry specific economic entity.

Such scientists as M. F. Wiersema, J. B. Beck (2017) dealt with the problems of modeling diversification processes at industrial enterprises, who consider models for implementing the processes of diversification of enterprises and organizations of the industrial complex.

Thus, it is advisable to consider the diversification of an enterprise's activities as a tool for managing its development, and the types of diversification depend on the scope of activity, size, resources and strategic goals of the enterprise.

3. Research questions

The reforms carried out by the economic policy of Kazakhstan are based on the issues of diversification and modernization of production, the creation of high-tech products with high added value, as well as increasing competitiveness and strengthening positions in the world market. Modernization, technical and technological renewal of production as the most important condition for reaching a qualitatively new level of development is one of the priorities of industrial enterprises. Light industry enterprises are no exception, where, as a study, the author will consider methods with which to consider diversification strategies for light industry enterprises (Figure 1).
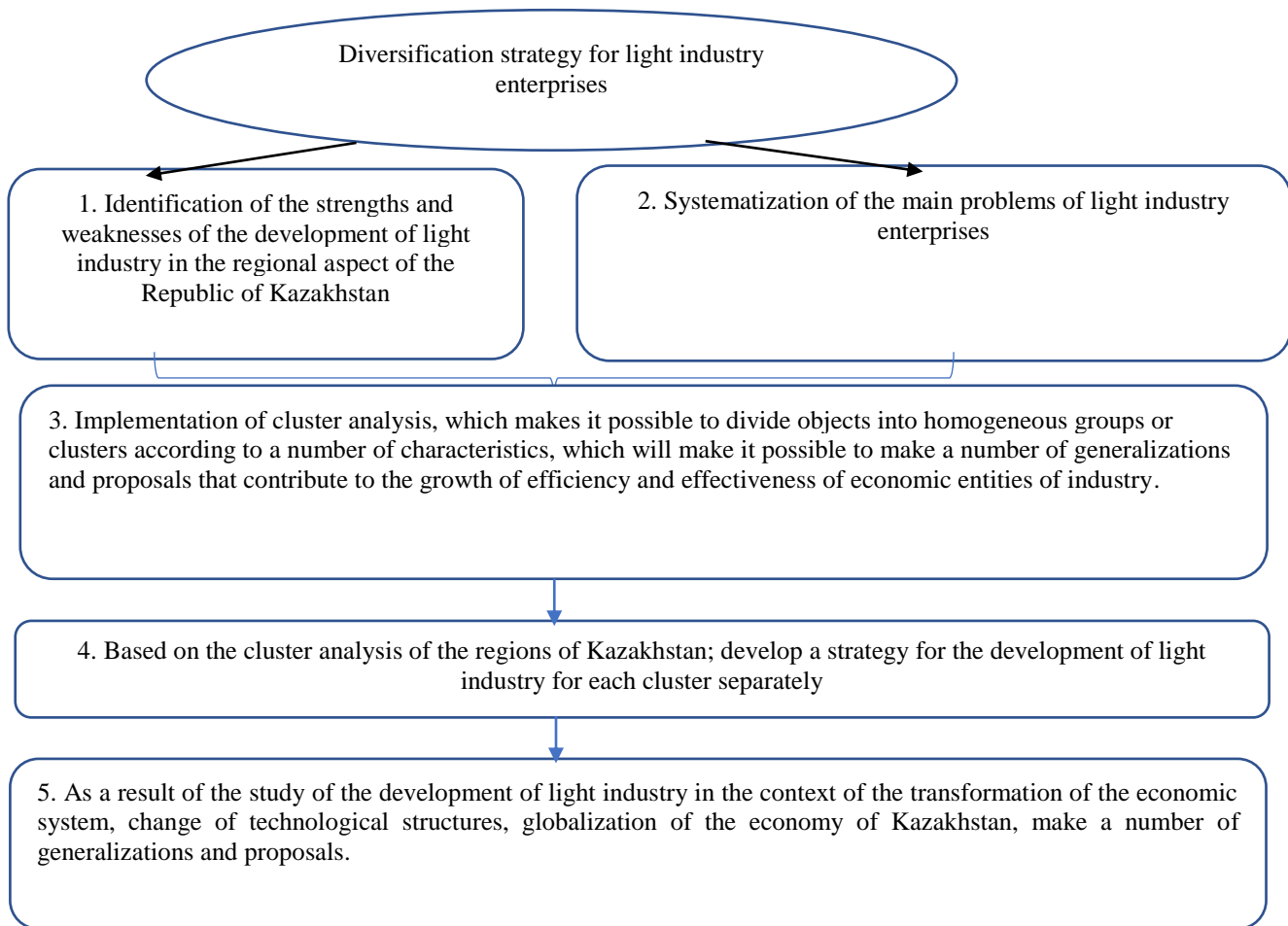
Figure 1. Research questions
Source: compiled by authors

Choosing a policy of active diversification of activities, it is necessary to start with the development of a strategy that comprehensively takes into account the economic factors of production of light industry enterprises, the needs of the region in the development of change processes, the accumulated potential of industry complexes, investment and innovative conditions for doing business. Having systematized the main problems of enterprises in this industry and on the basis of these data, the author applied cluster analysis, which makes it possible to divide objects into homogeneous groups (clusters) according to a number of characteristics, on the basis of which it was revealed that the development strategy of light industry should be developed for each cluster separately.

4. Analysis and resuld of research

The textile and clothing industry of Kazakhstan covers only 10% of the needs of the domestic market. While for the formation of the country's economic security, the volume of domestic production must at least satisfy 30% of domestic demand (Official site of Ministry of finance of the Republic of Kazakhstan, 2020).
Considerable attention is paid to the development of light industry in many countries, since the industry is of social and economic importance, providing high employment for the population. The importance of this industry also lies in the fact that in terms of consumption, the light industry is in second place, behind only the food sector. In world GDP, the share of light industry is about 3%, while in the largest producing countries the indicator exceeds 10%. For example, in Portugal - 22%, China - 21%, Italy - 12%. In Kazakhstan, the impact of the industry on the economy is practically insignificant - 0.2% in the structure of GDP, and its share in the manufacturing industry is no more than 1.2%.

Kazakhstan's light industry is on the periphery of the state's attention due to the overwhelming role of the extractive industries in the economy (Figure 2).
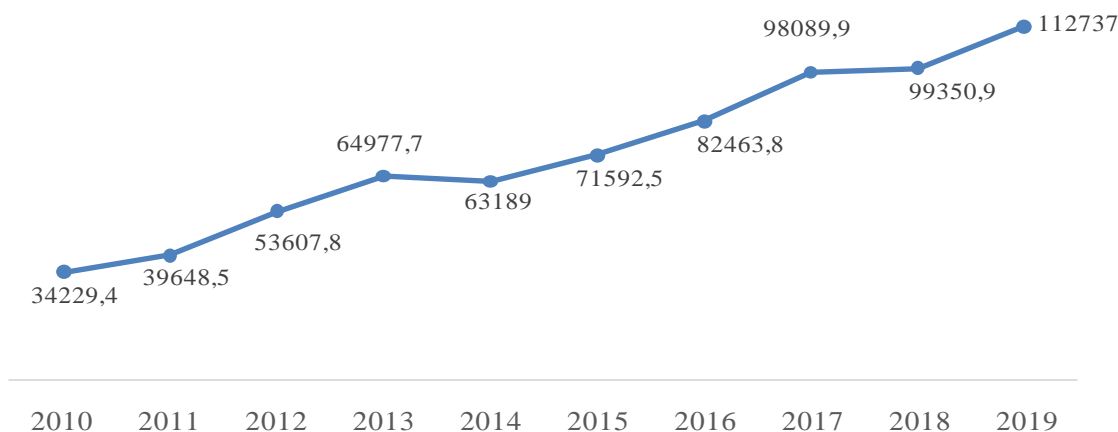

Figure 2. Dynamics of the volume of production of light industry of the Republic of Kazakhstan for the period from 2010-2019, in million tenge
Source: compiled by authors according to official site of Kazakhstan center of industry and export, https://qazindustry.gov.kz/

Today, the light industry of Kazakhstan carries out both the primary processing of raw materials and the release of finished products. This is a complex area, which includes more than 20 sub-sectors, which can be combined into three main groups: textile, garment, as well as leather, fur and footwear. In the structure of light industry products in Kazakhstan, 51% is accounted for by the production of textiles, 38% - by production, clothing and 11% is the production of leather and related products (Figure 3) (Official site of Kazakhstan center of industry and export, 2019).
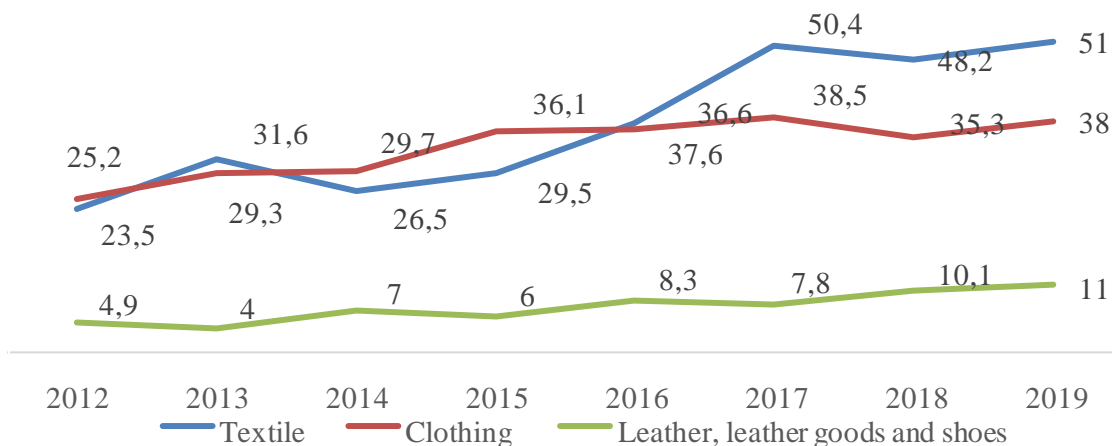
Figure 3. Dynamics of production volumes of light industry of the Republic of Kazakhstan for the period from 2012-2019, in %
Source: compiled by authors according to official site of Kazakhstan center of industry and export, https://qazindustry.gov.kz/

In the structure of light industry products in Kazakhstan, 51% is accounted for by the production of textiles, 38% by the manufacture of clothing and 11% by leather products. The overall growth of the light industry last year was 4.4%.

Based on the data in Figure 4, it can be seen that the textile industry predominates in the structure of light industry, the growth of which is provided by an increase in the production of cotton fiber, textiles and outerwear. There is a decline in the production of leather products due to a decrease in the production of footwear.

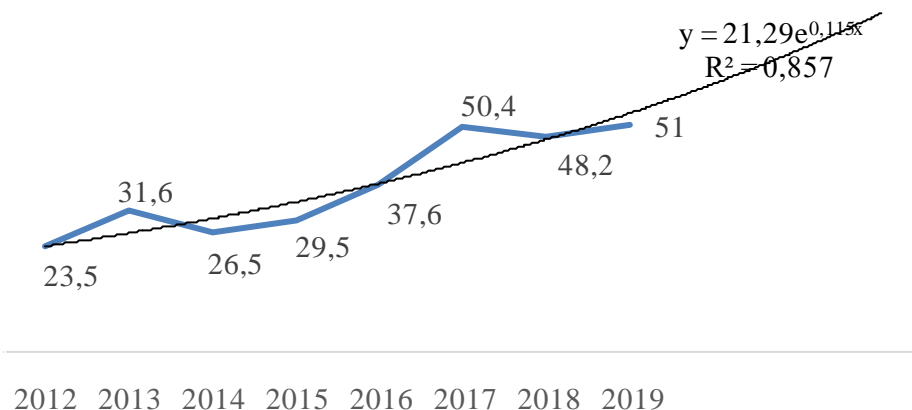$$y = 21,29e^{0,115x}$$
$$R^2 = 0,857$$

Figure 4. Forecast values of the development of the textile industry of the Republic of Kazakhstan for 2020-2022 based on a trend model
Source: compiled by authors

The main concentration of the industry is observed in three regions in 2018 - Shymkent, Almaty region and Almaty (Table 1) (Digest on light industry, 2019).

1089

Table 1. Production of light industry products by regions of the Republic of Kazakhstan for 2015-2018

Table 1. Production of light industry products by regions of the Republic of Kazakhstan for 2015-2018 Region	2015	2016	2017	2018
Atyrau	1,3	1,4	1,9	3,3
Aktuibinsk	0,9	0,6	1,0	2,6
Mangistau	2,6	2,1	2,4	2,6
Kostanay	4,4	3,2	3,2	2,6
Kyzylorda	0,5	0,2	0,9	1,5
Akmolinsk	5,2	5,7	5,7	6,7
North Kazakhstan	1,9	1,7	2,6	1,6
West Kazakhstan	1,2	0,8	1,0	1,3
Astana city	2,4	2,9	3,1	3,1
Karaganda	6,8	4,6	5,3	5,4
South Kazakhstan	35,3	26,2	34,9	26,7
Zhambyl	1,8	2,0	2,8	3,5
Pavlodar	5,7	4,7	6,0	5,4
East Kazakhstan	4,6	3,5	4,3	4,3
Almaty	11,5	8,3	12,0	11
Almaty city	13,8	10,6	9,6	10,8

Source: compiled by authors according to the light Industry Digest for the period from 2015-2018

Despite the fact that during the period from 2015-2018 there were changes in the regional aspect, the indicators of the South Kazakhstan region and the city of Almaty are still leaders (Figure 5).
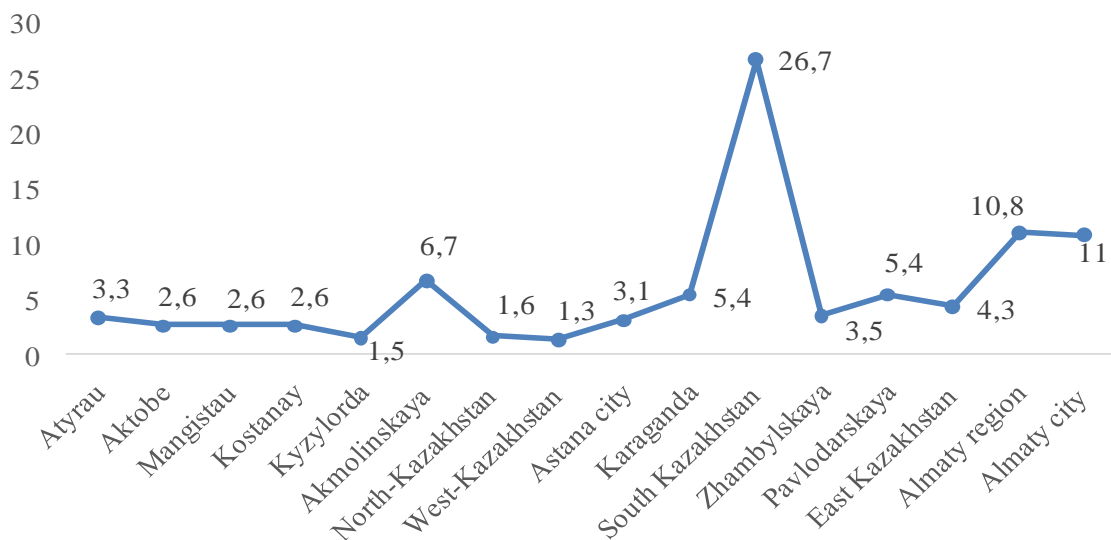

Figure 5. Indicators of the development of light industry production by regions of the Republic of Kazakhstan for 2018
Source: compiled by authors

It should be noted that the use of one or another strategy for the development of light industry depends on the state of this industry in a particular region of the country. In this regard, we believe it is advisable to classify all regions of the Republic of Kazakhstan according to three main indicators of light industry production - the volume of production of textiles (million tenge), clothing (million tenge), leather and related products (million tenge) (Table 2) (Official site of Ministry of finance of the Republic of Kazakhstan, 2020).

Table 2. Volumes of production of certain branches of light industry in the regions of the Republic of Kazakhstan in 2018

№	Regions	Manufacture of textiles	Manufacture of wearing apparel	Manufacture of leather and related products
1	Akmolinsk	5 157,25	514,57	203,34
2	Aktuibinsk	398,83	849,08	1,78
3	Almaty	4 884,09	8 019,28	743,39
4	Atyrau	1 817,21	490,25	12,29
5	West Kazakhstan	288,71	709,11	13,35
6	Zhambyl	169,32	1 226,16	1 788,92
7	Karaganda	813,67	4 670,57	588,34
8	Kostanay	2 072,27	1 201,22	58,79
9	Kyzylorda	831,91	1 064,85	0,00
10	Mangistau	35,60	1 622,25	804,47
11	South Kazakhstan	19 317,01	4 962,47	531,87
12	Pavlodar	3 552,68	1 263,57	2,40
13	North Kazakhstan	221,53	4 999,53	20,59
14	East Kazakhstan	1 292,52	2 710,14	578,83
15	Astana city	1 274,72	2 272,30	22,31
16	Almaty city	1 361,64	9 439,20	3 215,69

Source: compiled by authors according to data's of the volume of manufactured products (goods, services) in current prices by region

To classify regions, we use cluster analysis, which allows us to divide objects into homogeneous groups or clusters according to a number of features. Objects are considered homogeneous if the observed features are in close proximity to each other. The proximity metric is the distance metric.
To solve the problem, the usual Euclidean metric was used, according to which the distance between observations is calculated by the formula:

$$d_{i,j} = \sqrt{\sum_{k=1}^{p} \left(x_{ki} - x_{kj} \right)^2}, \quad (1)$$

We find the distances between all 16 regions and build the distance matrix (Appendix 1).

From the distance matrix (Table 3) it follows that regions 2 and 5 are the closest to each other $d_{2,5} = 178,47$, so we combine them into one cluster and go to the next division.

The distance between clusters is determined according to the principle of "nearest neighbor", which is described by the formula:

$$d_{r,q} = \frac{1}{2}d_{l,q} + \frac{1}{2}d_{m,q} - \frac{1}{2}\left|d_{l,q} - d_{m,q}\right|, \quad (2)$$

where:

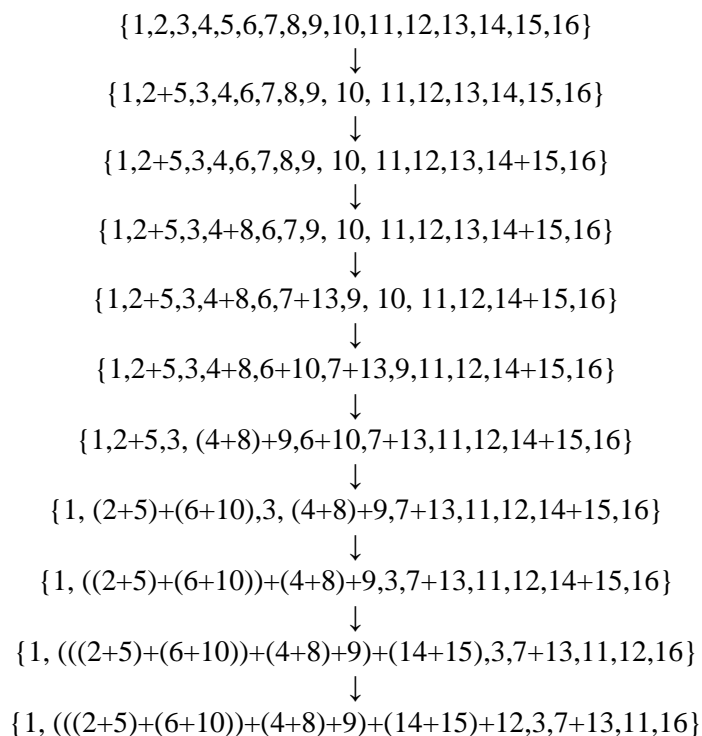$d_{l,q}$; $d_{m,q}$ – geometric distances between the corresponding clusters.

So, the distance between region 1 and cluster (2 + 5) is:

$$d_{1,(2+5)} = \frac{1}{2}d_{1,2} + \frac{1}{2}d_{1,5} - \frac{1}{2}\left|d_{1,2} - d_{1,5}\right| = \frac{1}{2}\cdot 4774{,}43 + \frac{1}{2}\cdot 4876{,}13 - \frac{1}{2}\cdot\left|4774{,}43 - 4876{,}13\right| = 4774{,}43$$

Carrying out similar calculations, we obtain a new distance matrix (Appendix 2).

Finding the minimum distance between objects again $d_{14,15} = 708{,}34$, we combine them into a cluster and, according to the principle of "nearest neighbor", determine the distance between clusters. Thus, we build the distance matrix again.

We continue the calculations until the value of the minimum distance, which determines the elements to be combined, sharply increases. The sequence of combining clusters is represented as a diagram:

$$\{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16\}$$
↓
$$\{1,2+5,3,4,6,7,8,9, 10, 11,12,13,14,15,16\}$$
↓
$$\{1,2+5,3,4,6,7,8,9, 10, 11,12,13,14+15,16\}$$
↓
$$\{1,2+5,3,4+8,6,7,9, 10, 11,12,13,14+15,16\}$$
↓
$$\{1,2+5,3,4+8,6,7+13,9, 10, 11,12,14+15,16\}$$
↓
$$\{1,2+5,3,4+8,6+10,7+13,9,11,12,14+15,16\}$$
↓
$$\{1,2+5,3, (4+8)+9,6+10,7+13,11,12,14+15,16\}$$
↓
$$\{1, (2+5)+(6+10),3, (4+8)+9,7+13,11,12,14+15,16\}$$
↓
$$\{1, ((2+5)+(6+10))+(4+8)+9,3,7+13,11,12,14+15,16\}$$
↓
$$\{1, (((2+5)+(6+10))+(4+8)+9)+(14+15),3,7+13,11,12,16\}$$
↓
$$\{1, (((2+5)+(6+10))+(4+8)+9)+(14+15)+12,3,7+13,11,16\}$$

Based on the schematic presentation of the results of cluster analysis, it can be concluded that all regions of the Republic of Kazakhstan in terms of production of textiles, clothing, leather and related products are divided into six clusters:

1- Akmola region (1),
2- Aktobe region (2), Atyrau region (4), West Kazakhstan region (5), Zhambyl region (6), Kostanay region. (8), Kyzylorda region. (9), Mangistau region (10), Pavlodar region (12), East Kazakhstan region. (14), Astana city (15);
3- Almaty region (3);
4- Karaganda region (7), North Kazakhstan region (13);
5- South Kazakhstan region (11);
6- Almaty city (16).

Thus, strategies for the development of light industry should be developed for each cluster separately.

The main concentration of the industry is observed in three regions of the Republic of Kazakhstan - these are Shymkent, Almaty region and Almaty. Based on this, we presented data for 2018 on the industry specialization of these regions (Figure 6) (Official site of data of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken", 2018).
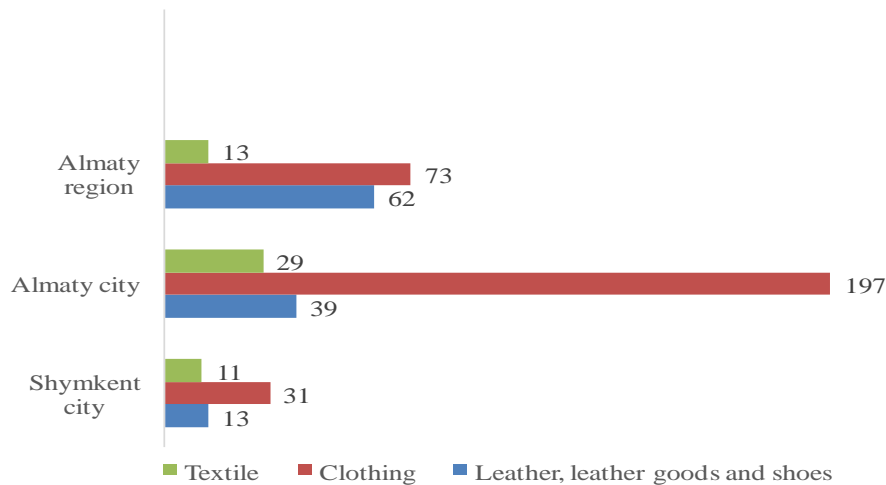

Figure 6. Industry specialization of the southern regions of the Republic of Kazakhstan for 2018
Source: compiled by authors according to Data of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" for 2018.

In 2018, in the regional context, the following enterprises were the main manufacturers of light industry:
1) South Kazakhstan region - 35%, where the main enterprises of the region can be distinguished: JSC Melange, JSC Utex, LLP AzalaTextile, LLP Zhanatalap-MT, LLP Khlopkoprom-Cellulose LLP Bal Tekstil ;
2) Almaty city - 14% with the main enterprises - Kazlegprom-Almaty LLP, KazSPO-N LLP, PKF Kazakhstan Texti-Line - Mimioriki;
3) Almaty region - 12% - LLP Mediateks-N, LLP Glasman, LLP Universal.

The maximum production growth is observed for the following products:
- finished textile products (2.6 times);

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

- sweaters, jumpers, pullovers, cardigans, etc. (2 times);
- products from natural fur (by 53%);
- leather from cattle skins or horse skins (by 29%);
- knitted socks (by 10%) (Table 5).

Table 5. The volume of production of the main types of light industry products for 2015-2019

Type of product	Unit measurements	2015	2016	2017	2018	2019
Cotton, carded and combed	tons	51337	53751	67881	71374	72177
Fabrics	thousand m²	48555	57791,6	55873,2	60905,4	70514,9
Bed sheets	thousand pieces	1940,9	3037,3	3622,7	4717,7	7474,3
Felt	tons	209	189	132	137	141
Felted and felt footwear	thousand pairs	104	114	98,9	62	52,6
Knitted outerwear	pieces	40138	62389	86233	85487	158124
Other outerwear for men	pieces	363409	296058	279112	207486	230116
Other outerwear for women	pieces	260891	310897	328728	228490	243291
Products from natural fur (short fur coats, bekesh, sheepskin coats from fur)	pieces	2467	3260	2297	4580	7643
Machine or hand-knitted socks	thousand pairs	1646	9990	9915	10988	15776,4
Sweaters, jumpers, half-overs, cardigans, vests	pieces	72821	64878	146413	146413	177419
Leather from cattle or horse skins	thousand dm²	155287	102550	85823	111197	142941,3
Footwear, except sports, protective and orthopedic footwear	thousand pairs	1558	1584	1230	1084	1270,4

Source: compiled by authors according to the light Industry Digest for the period from 2015-2019
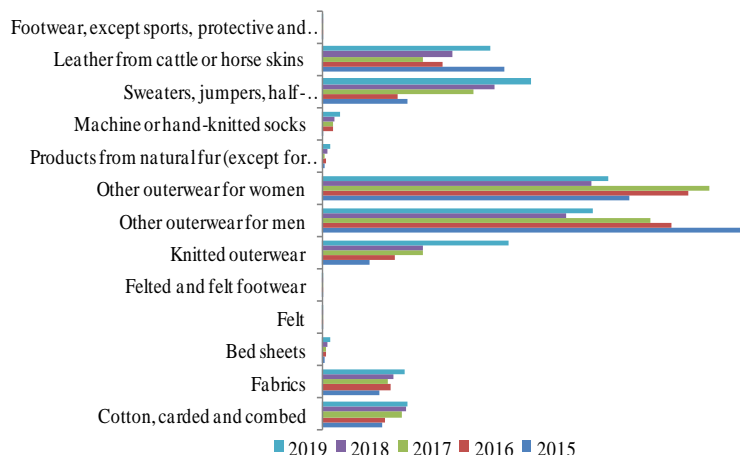

Figure 7. Dynamics of the volume of production of the main types of light industry products for 2015-2019
Source: compiled by authors according to the light Industry Digest for the period from 2015-2019

According to Figure 6, we see that the highest demand is for the products of men's and women's outerwear, as well as fur products (Figure 8).

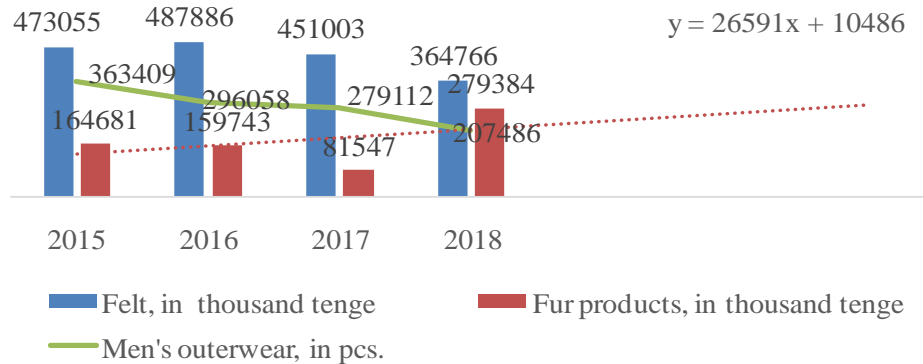**Figure 8.** Dynamics of indicators of goods in demand for the period from 2015-2018
Source: compiled by authors

The demand for light industry goods is taken into account when forming a consumer basket (a group of non-food products). It is possible to distinguish groups of consumers depending on age (Figure 9) (Sedelev, 2019).
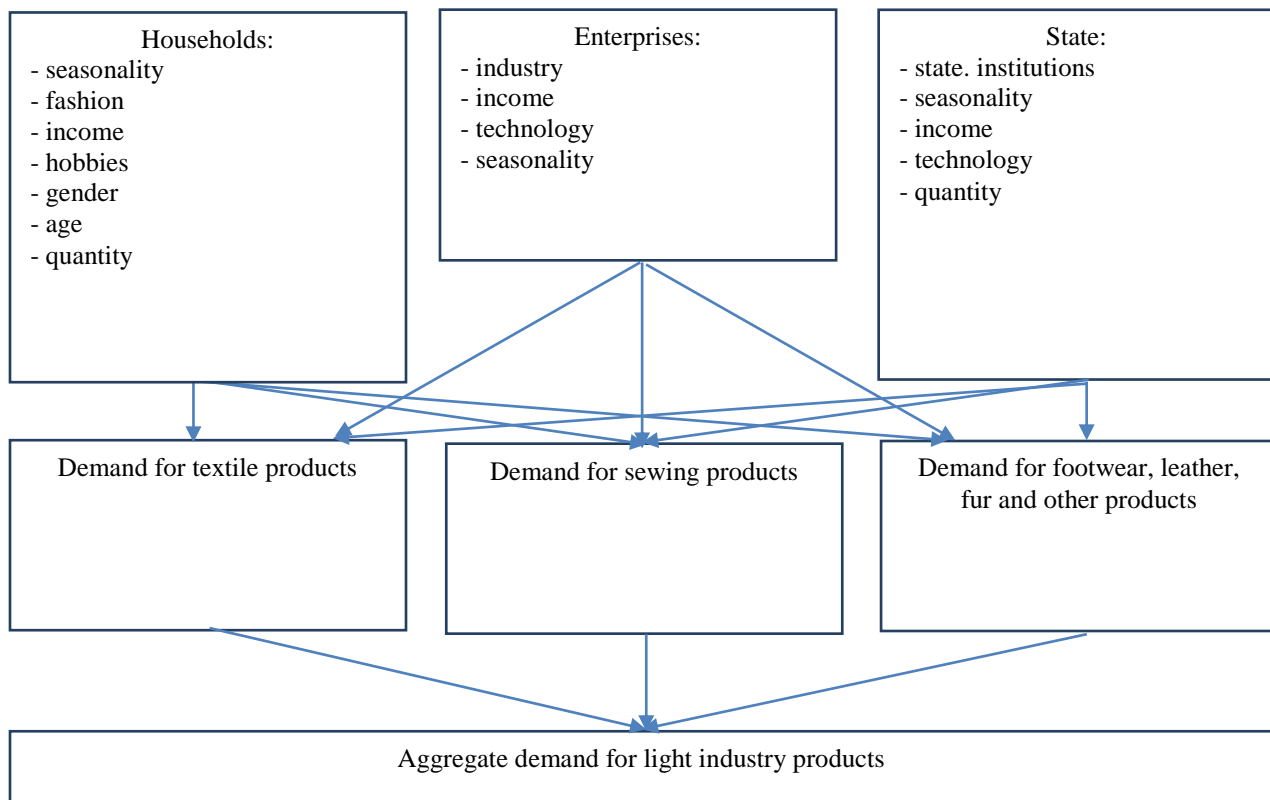

Figure 9. Aggregate demand for light industry products
Source: compiled by authors

Group 1 - children, which includes boys and girls from 0 years old to 15 years old inclusive;
Group 2 - able-bodied population, that is, aged 16 and men up to 59 years old, and women up to 54 years old;
Group 3 - pensioners, that is, men from 60 years old, women from 55 years old and until the end of life
The Republic of Kazakhstan has great potential, since Kazakhstan is in a single market with Russia and Kyrgyzstan in the EAEU, where there are no customs borders. Also, Kazakhstan has a competitive advantage in that we border with China. In this regard, we can argue that globalization affects the economies of all countries and is characterized by:
- the transformation of the world community into an integral economic system, which can be called a planetary economy;
- the weakening of state regulation as a result of the process of transformation of the national - state form of organization of people's life into a new form governed by international, multilateral agreements;
- the creation of international integration associations as a result of the merger of national markets into a "common market";
- the development of transnational capital, the financial sector and the stock market are acquiring global proportions;
- an increase in the speed of transactions as a result of the development of mobile communications, Internet technologies, which leads to an even greater interdependence of countries from each other.
In these conditions, the priority development of light industry must be coordinated with foreign trade policy and use the export financing mechanism.
For example, the export of light industry products in 2018 compared to the same period in 2017 decreased by 15.7% to $ 179 million. Imports of light industry products in 2018 amounted to $ 1,281 million, which is higher than the same period indicator of 2017 by 15.6% (Figure 10).
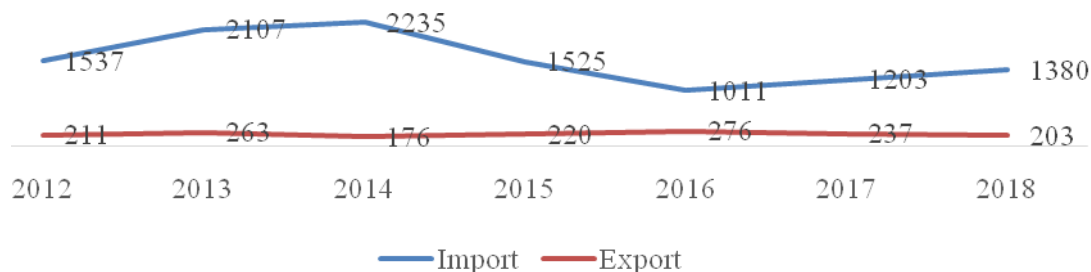

Figure 10. Dynamics of indicators of export and import of light industry products of the Republic of Kazakhstan for the period from 2012-2018
Source: compiled by authors according to the light Industry Digest for the period from 2015-2019

In Kazakhstan, about 10% of light industry products are exported. At the same time, export supplies are carried out by only 30 enterprises. Their products are sent mainly to the markets of China, Russia, Kyrgyzstan, Italy, Lithuania, Uzbekistan.

At the end of 2019, the export volume exceeded 20 thousand USD dollars. The main commodity groups were cotton fiber, textile materials, impregnated, coated or laminated with plastics, bed linen.
To stimulate the export of products, enterprises are reimbursed up to 50% of transport costs. This should reduce the cost of production by up to 10%, as well as expand the geography of exports and the range of goods.

Accordingly, having considered the dynamics of the development of indicators of exports and imports of light industry products of the Republic of Kazakhstan, we can analyze the structure of exports and imports of the main types of this industry (Table 6).

Table 6. Structure of exports and imports of the main types of light industry products, in %

Table 6. Structure of exports and imports of the main types of light industry products, in % Indicator	2015	2016	2017	2018
Export				
Cotton fiber	24	17	33,3	36
Textile materials		14	34	17,9
Other cotton bed linen	-	-	2,9	7,1
Cotton yarn	4,5	2,5	2,0	6,1
Cotton fabrics	4,5	2,5	4,0	3,9
Tanned cattle leather	8	6	4,8	3,8
Other	21	14	17	25,2
Shoes	38	44	2	
Total	100	100	100	100
Import				
Other shoes	24	22	23	16,5
T-shirts, sweatshirts with sleeves	3	-	2	2,9
Clothing and other products	27	27	36	2,4
Pants, overalls	3	1	1	2,1
Women's suits	3	2	2	2
Woven carpets, etc.	5	5	24	2
Others	35	43	12	72,1
Total	100	100	100	100

Source: compiled by authors according to the light Industry Digest for the period from 2015-2019

Meeting the demand for domestic products is impossible without the introduction of innovative technologies. The main volume of footwear export was delivered to Russia, cotton fiber to Latvia, Moldova, women's and men's clothing to Russia, cotton fabrics and yarns to Lithuania, Turkey, tanned leather or leather crust to China and Italy.

A comprehensive study of the development of light industry in the context of the transformation of the economic system, change of technological structures, globalization of the economy of Kazakhstan made it possible to make a number of generalizations and proposals:
1 The study revealed the influence and relationship of the development of light industry with technological structures, since it is the textile industry that is the leading industry and has a strong influence on the development of other industries.
2. The ongoing process of globalization of Kazakhstan under the WTO conditions has a serious impact on the sub-sectors of light industry, which can be classified as vulnerable sectors of the economy. The ongoing industrial policy in the field of light industry should be coordinated with foreign economic policy in order to use the positive aspects that globalization gives (for example, a decrease in import duties on high-quality raw materials and equipment), but at the same time preserve and develop its own light industry, turning it into a competitive industry economy.
3. The study of the aggregate demand for light industry products showed that it is formed by all subjects of the market economy (households, enterprises and the state) and, under certain assumptions, corresponds to the generally accepted neoclassical concept. It is especially worth noting that light industry goods are included in the

consumer basket (group of non-food products) and belong to essential goods, the demand for which may not be elastic in a scarce, undeveloped market.

4. Experts say that one of the main problems hindering the development of the industry is the high share of gray imports. The World Bank estimates this amount at no less than $ 2 billion. Almost 90% of products enter the country without certificates of conformity, without paying any taxes. In addition, Kazakhstani producers compete in unequal conditions with producers from the EAEU countries, China and Turkey. For example, in Kyrgyzstan, all light industry enterprises, regardless of size, are tax-exempt and operate under a patent. The country managed to keep this privilege even by joining the WTO. Support is provided to both manufacturers and exporters of clothing in China and Turkey. Russian manufacturers do not remain without subsidies (Burdenko, 2018). Therefore, Kazakhstan light industry companies also need protection.

5. The strengthening of the global factors of transnationalization of the production of light industry goods has led to the fact that no national light industry sector or group of enterprises, regardless of its size and level of development, can become self-sufficient for a long time, due to the rapidly changing environment, which, taking into account the threats of competitors from other countries determines the need for organizational integration of individual national enterprises or their groups at the regional, interregional and national levels. The main components of the globalization of light industry in Kazakhstan are:

- expansion of international economic ties in production and sales;
- growing internationalization of factors of modernization development by increasing direct and portfolio foreign investments;
- exchange of knowledge and technology;
- the spread of industry groups with varying degrees of integration in the light industry, the characteristic features of which are the interchangeability and interdependence of business units, their focus on combined information resources, on markets with a high level of consumption.

T.N. Kashitsyna, N.N. Rustamov (2018), speaking about the prospects for the development of light industry, note that ensuring the effective flow of the processes of introduction and commercialization of technologies requires targeted and systemic actions both on the part of state authorities (legislative and executive) and on the part of the private sector.

In these conditions, a new organizational scheme for managing the strategic development of the industry is needed in Kazakhstan's light industry, reflecting the fundamental changes that have occurred in the last decade. A distinctive feature of these changes is the transition from direct government to indirect regulation and the growing role of various forms of partnership between the state and private capital at different levels of government.

The development of the methodology for managing the strategic management of the light industry of the Republic of Kazakhstan will make it possible to most effectively use new and adapt existing methods and mechanisms for managing corporate structures and enterprises, to solve the problems of restructuring both the industry and its individual enterprises.

5. Conclusion

In the course of the study, it was revealed that the mechanism for diversifying the production of industrial enterprises should be understood as a system that determines the order, content and relationship of processes, procedures, elements and methods, organizational support and information flows aimed at implementing the production of new products. that the department of material and technical supply and sales forms data sources, which provide an assessment of the competitiveness of the company's products in comparison with the products of other manufacturers, which will allow the company to identify its capabilities associated with changes in the market situation. Such opportunities can be the introduction of advanced technologies and changes in production

technology based on tracking the main trends in the technological field, as well as the training of qualified personnel.

To ensure financial and economic stability and reduce commercial risks, it is necessary to use modern development strategies and models of interaction with other market participants, which, in turn, requires improved management, mainly based on the priority of the production diversification strategy. Investigating the processes of diversification of production in the light industry of Kazakhstan, the author came to the conclusion that the use of one or another strategy for the development of light industry depends on the state of this industry in a particular region of the country. In this connection, a classification of all regions of the Republic of Kazakhstan was made according to three main indicators of light industry production - the volume of production of textiles (million tenge), clothing (million tenge), leather and related products (million tenge).

A comprehensive study of the development of the light industry of Kazakhstan using cluster analysis, which allows the division of objects into homogeneous groups (clusters) according to a number of characteristics, made it possible to make a number of generalizations and proposals that will contribute to an increase in the efficiency and effectiveness of economic entities of industry. In particular, the assessment of the potential for diversification of light industry production was carried out in order to identify the opportunities available to light industry enterprises to produce different types of products, while ensuring positive, other things being equal, the values of the main financial and economic indicators. Based on the analysis of economic conditions and tendencies in the development of light industry in Kazakhstan, the strengths and weaknesses of the development of the light industry in the regional aspect were identified, the main problems of enterprises in this industry were systematized, and on the basis of these data, cluster analysis was applied, which makes it possible to divide objects into homogeneous groups or clusters based on a number it was revealed that the strategy for the development of light industry should be developed for each cluster separately.

The foundation of such a structure will create conditions for the introduction of advanced technologies and innovative developments into the light industry, actively interacting with business and the market, thereby ensuring the innovative development of the country and increasing the financial stability of economic entities.
Thus, given the historical and current dynamics of the development of light industry, existing and planned measures of state support for the industry, the existing integration (EAEU, WTO), as well as an increase in the innovative activity of enterprises, an increase in the competitiveness of manufactured products and the development of the industry as a whole can be expected. Country is faced with the task of not integrating into the world economy at any cost, but taking a place in it that is adequate to its economic potential.

It should also be noted that the diversification management process should be continuous. In addition to continuity, management should be cyclical, since changes in the market situation and consumer reactions to diversified products of light industry enterprises should be reflected in the planning of their future activities.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

References

Ansoff, I. 1989. Strategic management. Moscow: Economics, 520 p.

Brousek, N. 2018. Fertigung technischer Textilien und Hochleistungs gewebemit Profinet und SPS. MelliandTextilber, 3(94), 159-160.

Bochkarev, A. 2019. Updating the improvement of information support systems for an industrial enterprise. Creative Economy, 6(13), 1205-1214. https://doi.org/10.18334 / ce.13.6.40754.

Burdenko, E. 2018. Retrospective analysis of the development of organizational forms in the textile industry. Scientific journal "Design and Technologies", 11(32), 132-138.

Coste-Maniere, I., Croizet, E., Sette, K., Fanien, A., Guezguez, H. 2018. Circular economy: A necessary evolution, Circular Economy in Textiles and Apparel: Processing, Manufacturing, and Design. The Textile Institute Book Series, Woodhead Publishing, 246 p.

Dmitriev, Yu., Petrukhin, A., Shustrov, L.I., Shustrov T.L. 2019. Ways to improve the management of the development of the textile and light industry in the region. Economy and management: problems, solutions, 1(2), 40-45.

Digest on light industry for the period from 2015-2019. 2019. Astana. https://qazindustry.gov.kz/

Ilyashenka, S. 2016. Marketing and management of innovative development. Sumi: VTD "University Book", 728 p.

Korinko, M. 2017. Diversification: theoretical and methodological foundations. Moscow: NNTsIAE, 488 p.

Kumar, P., Carolin, C. 2018. Future for circular economy. Subramanian Senthilkannan Muthu. Circular Economy in Textiles and Apparel: Processing, Manufacturing, and Design. The Textile Institute Book Series, Woodhead Publishing, 246 p.

Kazakhstan center of industry and export https://qazindustry.gov.kz/

Krasnikova, A., Melnikov, O., Starozhuk, E. 2019. The mechanism of tactical and strategic coordination of the departments of industrial enterprises under diversification. Russian Journal of Innovation Economics, 9(4), 1479-1488. https://doi.org/10.18334 / vinec.9.4.41324.

Kashitsyna, T., Rustamov, N. 2018. Prospects for the development of light industry. Technology of the textile industry, 5 (377), 15-18.

Mazzoni, F. 2020. Circular economy and eco-innovation in Italian industrial clusters. Best practices from Prato textile cluster. Insights into Regional Development, 2(3), 661-676. https://doi.org/10.9770/IRD.2020.2.3(4)

Mozglyakova, E. 2017. Factors affecting the investment attractiveness of an industrial enterprise: the interaction of factors of the internal and external environment. Economics, Sociology and Law, 3 (9), 126-132.

Ngai, E., Peng S., Moon, K. 2014. Decision support and intelligent systems in the textile and apparel supply chain: Academic review of research articles. Expert Systems with Applications, 1 (41), 81–91.

Official site of Tengrinews.kz. https://tengrinews.kz/money/o-samom-nasuschnom-v-razvitii-industrialnoy-politiki-360779/

Official site of Ministry of finance of the Republic of Kazakhstan. 2020. Forecast of socio-economic development of the Republic of Kazakhstan for 2020-2024. http://www.minfin.gov.kz/

Official site of Kazakhstan center of industry and export, https://qazindustry.gov.kz/

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Official site of Ministry of finance of the Republic of Kazakhstan. 2018. The volume of products (goods, services) produced in current prices by region for the period 2014-2017. http://www.minfin.gov.kz/

Official site of data of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" for 2018. www.atameken.kz.

Poplavskaya, Zh. 2018. The essence of the life cycle: advantages and factors affecting its formation. Scientific Bulletin of NTU, 8(18), 169-175.

Program "Business Roadmap 2020". 2017. Approved by the Resolution of the Government of the Republic of Kazakhstan of 2010.

Rajnoha, R., Lesnikova, P., Stefko, R., Schmidtova, J., Formanek, I. (2019). Transformations in Strategic Business Planning in the Context of Sustainability and Business Goals Setting. Transformations In Business & Economics, Vol. 18, No 2 (47), pp.44-66.

Shevchenko, I., Razvadovskaya, Y., Marchenko A. 2019. Russian textile industry: Past and present. Terra Economicus, 17(1), 131-149.

Simay, K., Deniz, N. 2018 Comparative advantage of textiles and clothing: evidence for Bangladesh, China, Germany and Turkey. Fibres and Textile Eastern Europe, 1(21), 14–17.

Sedelev, B. 2019. Regression models and methods for evaluating the parameters and structure of economic processes. Moscow: MEPhI, 240 p.

Thompson, A., Strickland, A. 1998. Strategic management. The art of developing and implementing a strategy. Moscow: Banks and exchanges, 576 p.

Wiersema, M., Beck, J. 2017. Corporation or Product Diversification. Oxford Research Encyclopedia of Business and Management. https://doi.org/10.1093/acrefore/9780190224851.013.14

Yusupov, S., Yusupova, D. 2020. Foreign experience in the development of textile and light industry. Actual scientific research in the modern world, 10(61), 24-30.

Zhukovskaya, I.F., Trufanova, S., Ivlieva, N. 2020. Development of enterprises of the domestic garment industry: problems and solutions. Problems of theory and practice of management, 1(2), 112-123.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Mergul CHEMIRBAYEVA is PhD student of Narxoz University, Almaty, Kazakhstan. Research interests: small and medium business, innovations, investments.
ORCID ID: orcid.org/0000-0002-6337-8057

Zhanat MALGARAYEVA is PhD, Associate Professor of Narxoz University, Almaty, Kazakhstan.
Research interests: finance, taxes, investments, budget, credit.
ORCID ID: orcid.org/0000-0003-4783-5438

Almagul AZAMATOVA is Candidate of Economic Sciences, Associate Professor of Narxoz University, Almaty, Kazakhstan. Research interests: small and medium business, innovations, investments.
ORCID ID: orcid.org/0000-0003-2400-4658

Publisher

http://jssidoi.org/esc/home

HIGHER EDUCATION INSTITUTIONS AND CORPORATE SOCIAL RESPONSIBILITY: TRIPLE BOTTOMLINE AS A CONCEPTUAL FRAMEWORK FOR COMMUNITY DEVELOPMENT

Christiana Kappo-Abidemi [1], Ogujiuba Kanayo [2]

[1,2]School of Development Studies, University of Mpumalanga, South Africa

E-mails: [1]C.Kappo-Abidemi@ump.ac.za; [2]Kanayo.Ogujiuba@ump.ac.za (Corresponding author)

Abstract. Corporate Social Responsibility (CSR) is predicated on three organizational pillars of economic values, social values and environment values known as the "triple bottom-line". This framework refers to an accomplishment of a win-win status quo amongst three units. Stakeholders within the Higher Education Institutions (HEIs) somehow have ways of enforcing organizations to comply with these triple bottom-line. However, profit making is not applicable to a considerable extent in (HEIs) funded by government, but accountability is of paramount importance. On the other hand, HEIs are facing *challenges* induced by labour market dynamics. This article is a based on the triple bottom line conceptual paradigm and reviews CSR and the importance of the paradigm for HEIs in community development for developing countries, using South Africa as a reference point. We relied on existing literature and our analysis suggest that HEIs need to take part in profitable relations with several stakeholders while integrating their visions and purposes into their CSR management agenda. For the reason that the structure of the community is somewhat complex because of diverse personalities with different levels of resource control; adopting CSR would benefit, appropriate integration of community development programmes.. Engagement through CSR will enhance mutual trust, reduce protest and help improve public image of the HEIs. Particular emphasis on HEIs support to economic welfare and social environs would be a value addition to community development.

Keywords: Stakeholders, Community Development, Corporate Social Responsibility, Triple bottom-line

1. Introduction

Development organizations for example, the United Nations, the World Bank and many others views Corporate Social Responsibility (CSR) as a prospective apparatus for generating development (Frynas, 2005). According to the DFID, in following socially accountable practices, the development that will be stimulated by the private sector will be more all encompassing, impartial and poverty dipping (Jenkins and Ogbara, 2008). As the public expectations of CSR endure and increase because of the bigger role Higher Education Institutions (HEIs) are playing in the public sphere, some HEIs are still looking for ways and means to incorporate CSR into their long-term business stratagems in a way that is advantageous to both education and society. Even though it is debated that being socially responsible does not at all times grow the financial bottom line; there are numerous cases of organizations that have remained profitable while applying more socially and environmentally accountable business models. Hence, promoters of CSR believe that in addition to or in the nonexistence of government regulation, CSR may well be an operational way for organizations to amend the negative effects of Foreign Direct Investment (FDI) and aggressively contribute to community development in a sustainable way.

The question of corporate social responsibility (CSR) has been in discourse for a very long time dating to the 1960s. Nonetheless, seminal research from Secchi (2007) and Lee (2008) echoed in Agedelo et al, (2019) show that the connotation of Social Responsibility has been varying in implication and practice. The orthodox view of the issue was narrowly restricted to charity and then moved to the importance on business-society relations. For the most part, this opinion referred to the contributions made by corporations towards resolving social problems. At the beginning of the twentieth century, social performance connected with market performance of corporations. Oliver Sheldon (1923, cited in Bichta, 2003), the proponent of this philosophy nevertheless, was on the side of management to take the creativity in increasing both ethical standards and justice in society through frugality. In doing so, commerce generates prosperity in society and provides improved levels of wellbeing. Consequently, the present-day corporate responsibility is a structure whereby business organizations consider the concerns of society and accept accountability for the effects of their activities on all, including the business environment. This responsibility shows that the organizations have to act in accordance with legislation and of their own accord create enterprises to increase the well-being of their employees. The HEIs are public entities governed autonomously and regarded as social resources (Ketschau, 2017). The educational system all over the world is latent with different challenges; some of the challenges are peculiar to a particular country while others could be generic. Likewise, communities in developing countries rely on the presence of government and non-governmental organizations to provide their needs, which could be healthcare, improved economic activities, employment generation and so on. Mutual understanding amongst stakeholders is achievable through engagement and proper consultation. Reiss in his interview with Rodney Martin, CEO, Voya Financial, a leading company that helps Americans plan and invest, brings forward his interviewee comment, Corporate responsibility comprises key characteristics of a business culture, such as integrity and transparency; diversity, equality; sustainability; governance; and volunteerism, philanthropy amongst others (Reiss, 2017).

CSR is continuous and long-term process guided by organization personal values. Concisely, Nwoba & Michael (2016) described CSR as the strategies adopted by organization to conduct business in an ethical, societal friendly and beneficial manner to community in term of development. CSR is expected to be a collective effort of all stakeholders through engagement and interaction at all levels. This can involve; working in partnership with local communities, developing relationship with employees and customers, social responsible investment and environmental protection and sustainability. Stanislavska, Kvasnicka, Kuralova & Margarisova (2014) also explained CSR as voluntary interaction of the organization with stakeholders. However, in South Africa CSR has been made mandatory to companies in order to be BBBEE and Corporate Governance compliant but it is expected

to be applied in relevant to the situation (Solomon, 2013). Corporate social responsibility is universally significant as the continuing responsibility by corporate organizations to act virtuously and support economic development in-addition to increasing the value of life of the employees and their relatives as well as the local community and society in general (Alzyoud & Bani-Hani, 2015). The ultimate aim of the corporation is not just the success of business but the welfare of the society at large. Similarly, the society also become interested and concerned about the business. Hence, the emphases is on the need to reconcile ethic with business by doing what is right for the survival of the planet and the life it supported. Progressively, corporations are displaying their corporate social responsibility actions, which boost Organizational appearance; this in turn, provokes positive public opinions Pang, et.al 2018). Owing to its market size and potential, the number of contending initiatives in Africa is increasing. In the foods and beverage industry for instance, corporations attract customers through promotional activities such as Advertising and Public Relations. Therefore, how to accomplish and maintain a savory appearance is a significant concern. Shu-Ling Hsu opined that corporations must launch their organizational image to stabilize their market place (Shu-Ling, 2018).

Higher Education Institutions are not completely exonerated from CSR because they are not hundred percent funded by the government despite being an autonomy entity. The activities of the HEIs in anyway are not expected to be detrimental to the society and environment. Bowens (2011) further explained that CSR influences issues such as civil rights, environs, labour, non-discriminatory operating practices, opposing exploitation and consumer protection. International Organization Standardisation 26000 article recommendations on CSR is also centred on the feedback of stakeholders from developing countries, business, government, consumers, labour, non-governmental organizations and others. Thus, the report articulates the views and perception of almost all pertinent parties and businesses. In recent years South African higher educational institutions have been faced with so many challenge such as induced from poverty amongst certain racial groups that lead to quest for free education, decolonisation of education, massification of education and politicalising of education (Kekana & Kubheka, 2016; Mabelebele, 2015). Public HEIs in South Africa is funded via government grants (50%), student tuition fees (25%) and other private income (25%) (DHET, 2004; de Beer, Jacobs, Moolman & Zaaiman, 2016). Some institution also have a way of generating income internally. Despite the enormous dependent on public funding, HEIs are also expected to abide by the provision of King IV report, whereby 'triple bottom line' baseline for measuring organizational performance is adopted (van der Walt, 2013). Historically, South African education system has not been receptive to people of coloured (Ramdass, 2009). At the dawn of democracy, various policies and laws were enacted for an all-inclusive relationship in every sphere of the society. In as much as the new democratic policies has opened the door of learning, the system is still been haunted by the ghost from the past (DHET, 2010; Badat, 2010). In South Africa, HEIs has been subjected to pressures such as fees must fall in the recent time. The mandate has pressurised the government to provide free education for all in South Africa in such a way that the HEIs has been in turmoil in the last 5 years. The demand of students for free education seems unending and the department is struggling to meet up with all of it (Masweneng, 2017). In addition, employees through their unions have also had expectations such as converting all temporary/contract non-skilled employees into permanent position, which sometimes end up in deadlock. HEIs do experience infrastructural challenges due to student influx, which requires government intervention. Host communities of HEIs have also to endure the protests and unrest that accompanied the demands of these internal stakeholders.

Nonetheless, interested party identification and administration is reasonably well understood in the literature for private sector organizations (Christopher, Payne, & Ballantyne, 2002, Rutterford, Upton, & Kodwani, 2006), and its importance is rising through all developing and developed countries (Maassen 2000, Wit, & Verhoeven, 2000, Peters 1996, Kettle 2002, Fasoulis, & Kurl, 2018; Girdzijauskaite, Radzeviciene, & Jakubavicius, 2019). In contrast, where stakeholder theory has grown in commercial arenas (Donaldson, & Preston, 1995), there are fewer studies in the public and not for profit areas (Bryson 2004), typically with respect to higher education institutions.

Higher Education Institutions (HEIs) represent a vital body part of any society. These institutions are facing new challenges that impose the need to be independent to a reasonable extent from governmental and state support. The South African changing environment in which HEIs function and the challenges that higher education face comprise mass increase of higher education; reduction of state expenditure and support; diversification of financial resources; internationalization; commercialization; changes brought by technology development, the adaptation of core curriculum to accommodate and capitalize on labour market requirements. These changes, no doubt have affectedthe quality of education, HEI autonomy, academic freedom and responsibilities towards society. Thus, HEIs are are moving toward corporatization which calls for them to be a good corporate citizen and the best approach for them to achieve that is by adjusting to the model of Social Responsibility. This article focuses on the necessity for higher education institutions to demonstrate responsible corporate citizenship to their diverse stakeholders, within the context of a developing country epitomized by South Africa. Hence, we focused on the level of engagement the stakeholders should expect as well as determine the role of HEIs in CSR for sustainable community development.

Theoretical Framework

Our paper is predicated on the stakeholder theory as propounded in 1948 by Edward Freeman. The principle postulates that organizations owe answerability as well as responsibility to extensive variety of stakeholders, other than just shareholders. These interested parties represents to all who affect or are influenced by organizations' actions. Astrie, Gatot and Yuni 2014 did hypothesize that these interested parties encompasses investors, suppliers, customers, employees, government, community and the environment. The key proposition of the philosophy is that organizations owe corporate accountability to broad range of stakeholders' interest. It considers an organization as an interconnected web of varied interests. According to Lin, the stakeholder theory is a theory of organizational management and business ethics that accounts for multiple constituencies impacted by business entities like employees, suppliers, local communities, creditors, and others. It asserts that managers must satisfy a variety of constituents who can influence the firm's outcomes and addresses morals and values in managing an organization, such as those related to corporate social responsibility, market economy, and social contract theory (Lin, 2018). The proponents accepted this theory as one of the schemes in humanizing the organization of firms' social responsible behaviour. The foundation for adopting this theory for this paper is that the discourse is around the framework of organizations' social responsibility schedule to generate development within its host community ultimately.

2. Triple Bottom Line Framework

The triple bottom line (TBL) is a concept that inspires organizations' pledge on social and environmental apprehensions just as they do on income flows. The TBL theorizes that as an alternative of one bottom line, there ought to be three: people, profit and the planet. This framework measures an organizations level of obligation to corporate social accountability and its impact on the environment in due course. A renowned British Management professional (John Elkington) in 1994, created the slogan "triple bottom line" as his way of gauging performance in corporate America. The principle behind the TBL was that organizational goals could be achieved in a way that not only profits is considered, but also people's lives are advanced and the planet protected. In corporate finance, when we refer to a firms' bottom line, we usually mean its profits and this is line with tradition, where corporate leaders concern themselves with the bottom line (monetary profits their businesses makes). However, Elkington's TBL framework supports the goal of sustainability in business practices, where organizations move outside profits to include social and environmental concerns to gauge the complete cost of doing business.. The TBL framework increases the old-style bookkeeping structure to encompass additional

performance areas: the social and environmental influences of organizations. These three fundamental dimensions are denoted as the three P's: people, planet, and profit (Figure 1).
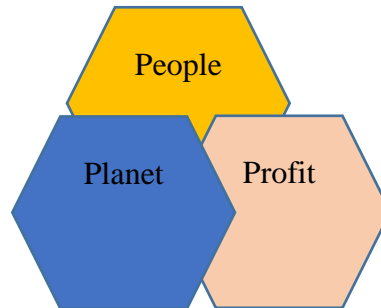

Figure 1: Triple Bottom Framework
Source: Authors

People refers to employees, the labor involved in a corporation's work, and the wider community where the firm operates. The importance is on how much an establishment supports the society. A triple bottom line organization pays a reasonable wage and ensures a good working condition at all units. Triple bottom line organization make an effort to give back to the community. This ingenuity is an example of "enlightened self-interest". The planet element of the triple bottom line specifies that corporations must decrease their environmental footprints as much as possible. These determinations should embrace financing renewable energy, managing natural resources efficiently, and improving the reduction of waste. Nevertheless, though every organization pursues profitability (financials), organizations embedded in the triple bottom line see it as part of a business plan. Therefore, sustainable organizations have acknowledged that profit is not entirely conflicting with people or the environment. TBL theory posits that businesses should be operating concurrently on the three bottom lines: People, Planet and Environmental Responsibility. Profit, is referred to the traditional corporate profit, the people measures how socially accountable an organization has been throughout its tasks, while the Planet measures how ecologically accountable an organization has been. By focusing on these three interconnected essentials, triple-bottom-line reporting can be a vital tool to supporting a firm's sustainability goals. Moreover, the TBL hypothesizes that if an organization highlights only finances and does not investigate how it interconnects socially, that organization cannot see the whole picture, and thus cannot account for the full cost of doing business.

Despite the fact, the triple bottom line has been in the dialogue for more than two decade, events such as the 2008 financial watershed, the British Petroleum oil spill, and climate variation discussions have continuously, casted spotlights on organization's ethics and their corporate social responsibilities. A more recent research at MIT found that establishments that treated sustainability with due recognition by making a business case for it with tangible goals were the ones that benefitted from sustainable activities. The achievement and practicality of business sustainability innovations is reliant on a gifted member of staff who knows how to take the triple bottom line from theory to reality. This worker must have a precise understanding of ecological science, bookkeeping, and economics. In addition, governance skills and the capacity to use systems thinking to make tactical corporate judgements are also significant for the employee.

3. Review of the Legal Framework for Coporate Social Responsibility in South Africa

Coporate Social Responsibility (CSR) is not merely a recurrent theme for discussion and argument in South Africa, but also a noticeable effort by most establishments. The social image of South Africa after the Apartheid period was one of obvious dissimilarities as per education, substructure, financial power, and access to basic services. The democratic administrations that have administered the country from 1994 have made significant efforts in contending with obvious social inequities through diverse social agendas and several public initiatives, in-addition to the gravitas given to the private sector. Even though the South African Companies Act 61 of 1973 does not indulge businesses to participate in CSR ventures, the policy document of the country and the King II and King III reports clearly support the need and significance for businesses to recognize all interested parties and to embrace a "triple-bottom line" approach (*Dekker and Esser 2008)*. Specifically, the King reports, focuses on social, environmental and economic concerns, which constituted accepted guides of finest practices in corporate governance in South Africa.The clauses in the reports are not compulsory, but they take a "comply/apply or explain" method that to some extent forces businesses to apply CSR programs or rationalize why they have not implemented them (*Sustainability SA)*.

Nonetheless, according to existing studies, not all CSR initiatives in South Africa result from voluntary or indirect business resolutions. Most of them are the creation of corporate acquiescence with the Black Economic Empowerment (BEE) legislation (*Sustainability SA)*. The BEE Act mandates South African-based businesses to consider all stakeholders when carrying out their internal and external processes in an effort to eliminate societal and economic imbalances inherited from Apartheid era and support previously discriminated groups to enthusiastically play a part in the country's economy. Corporations that refuse to comply with the BEE scorecard are given negative ratings, therefore complicating their capability to operate in the country. At the end, BEE is not entirely planned to address racial inequities; it also tries to fortify the socioeconomic spectrum of the country for parity and fairness. Even though large multinational corporations are the ones that are more dynamic with CSR, more and more businesses from many sectors and of diverse sizes are begining to demonstrate interest in social responsible policies not only because of global rising trends and external pressures, but also because it can lead to efficiency gains. Porter and Kramer (2011) posit that solving societal worries may well increase the levels of company output, with the ensuing positive effects in profitability and shared values

The King Reports – the "Codex" of South African CSR
Corporate governance guidelines and standards in South Africa are entrenched in the well-known King reports (*SAICA)*. Even though they are not approved legal documents; they are viewed as contemporary guiding principles on good corporate governance and its adoption is recommended in the country's business sphere. In 1994, the King Committee on Corporate Governance delivered the first report, King Report 1994, intended to stimulate corporate governance and satisfactory standards for board of directors of listed companies, financial institutions and some public enterprises. Although encouraging decent governance practices, the report also put emphasis on the need for corporations to be socially accountable in the areas and communities in which they operate. In 2002, the King II report on Corporate Governance was published. Relatively at the same time, the Johannesburg Stock Exchange (JSE) demanded listed companies to conform with the King report or else, explain why they were not following to the norm. The second document clearly established and explained the seven good corporate governance fundamentals that any corporation embracing the report should pay attention to: accountability, discipline, fairness, independence, responsibility, social responsibility and transparency. The revised third issue of South Africa's Code of and Report on Governance Principles (King III report) was made operative in March 2010. With respect to the earlier versions, the

new report emphases sustainability and risk issues, while continuing to highpoint the significance for companies to respond to all stakeholders. The areas covered in the report are the governance of risk, the governance of information technology, compliance with laws, rules, ethical leadership and corporate citizenship, boards and directors andaudit committees. Others include codes and standards, internal audit, governing stakeholder relationships and cohesive reporting and disclosure. Indirect regulatory actions, like the groundwork and dissemination of the previously mentioned documents, can without a doubt help stimulate CSR initiatives in diverse industries. That is also the case of the launch and growth of the Johannesburg Stock Exchange Social Responsibility Index (JSE SRI) in 2004. The SRI apprises financiers and market go-betweens about corporate sustainability policies and practices of listed companies, encouraging investors to support "friendly" companies, and pushing corporations to strengthen their environmental, social and governance enterprises. Responsible investment is a comparatively new concept (the Dow Jones Sustainability Indexes were introduced in 1999 and the FTSE4 Good Index Series was launched in 2001), especially in emerging markets where South Africa was the first one in launching a sustainability index, followed by Brazil in 2005 (BM&F Bovespa) (*Accountancy SA 2001).* According to King IV Report (2016) the organization values statements, usually state how all stakeholder both internal and external will be treated, the purpose and objectives of the organization, expectations of how work is done and how stakeholders should behave (IODSA, 2016). These values are expected to reflect in organization vision and mission statements and addresses the ultimate aims of CSR. Ethical issues are also one of the major concerns of CSR.

4. Stakeholders In HEIs and Corporate Social Responsibility

Freeman (1984) posits that an interested party may be any individual or group of individuals either impacted upon by the corporation or able to influence on the attainment of its goals. This is the conception behind Stakeholder Theory. The theory cogitates that the consequences of any activity should take into consideration the benefits for all interested parties involved and not only those of the shareholders. Within the context of public and not for profit organizations, Bryson (2004) in reaction to the Eden and Ackerman of 1998, identified interested parties as individuals that have the power to firmly effect, the future of the organization. Furthermore, Jongbloed et al. (2007) joined the debated and pointed out that the acceptability of higher education to the public is gauged continually by the dimension and prominence of the HEIs obligation to its community of stakeholders, which is essentially of superior depth than any modest maintenance of contacts. It realistically portends that the organization seeks out and embraces ways of including the stakeholders to best perceive how the latter, value the services provided and just how they will advance. Benneworth and Arbo (2006), argue that a plausible importance from the above discourse is that these demands will induce a new method to governance and social accountability, improved professional management and a reassessing of the university business models for developing countries. Jongbloed et al., (2007) inclined that the stakeholder theory is outstandingly valuable to HEIs in describing the attention provided to the many groups found in its environment additionally to the relational interface between HEIs and its communities. Nevertheless, amongst developing countries, South Africa inclusive, HEIs are yet to prove their competence to fittingly identify the stakeholders working with the institution as well as establish the needs of each entity and the level of prominence to accord to each relationship. However, for HEIs in the developing countries to meet stakeholder needs, much has to be done.

HEIs in South Africa have four basic pillars for assessing performance, which are teaching, and learning, research and scholarship, engagement and leadership, administration and management. Alzyoud & Bani-Hani (2015) explained that CSR could be achieved through all of these university core businesses. The South African department of higher education (DHET) in its value statement prioritised the need to address society problem through education and training, complied with the constitutional mandate of right to education and acknowledge

the need to work with all partners to achieve their goals. Furthermore, DHET value statements will help the stakeholders to know if the HEIs are keeping to their promises or not (Dubbink, Craafland & Liedekerke, 2014)

The implementation of CSR by the HEIs supposed to be the joint effort of the stakeholders within and outside the institutions (Bowen, 2011). Nonetheless, it is expected that individual institution may adopt a framework of values, mission and vision from the generic provision of the DHET. However, this is not an innovative approach to CSR, because as clearly mentioned in ISO 26000 document, there are lot of unidentified stakeholders in each organization. The onus thus lies on individual organization to identify people affected by their operations, their concerns and methods of engagement. Consequently, seven ideologies of social responsibility has been identified by Bowens (2011) as accountability, transparency, moral behaviour, reverence for stakeholder interests, reverence for international rules of behaviour and reverence for human rights. These values must be integrated in HEIs community development approaches

Stakeholders are described as the group of individuals that are interested in the business of the organization, these individual can be affected by the outcomes of the organization objectives and decisions (Khanyile, 2018). In order to determine the stakeholders in HEIs, it is recommended that the purpose and objectives of the institution as well as management responsibility towards the stakeholders should be identified. Stakeholders in South African higher education institutions involve both internal and external individuals that have stakes in the activities of the university and are affected by these activities. The internal stakeholders are clearly identified as students, government, staff (academics and administrative staff). The external stakeholders are a bit ambiguous and can only be defined according to various institutional plan within the provision of DHET. However, external stakeholders are identified as graduate students, employers of graduates, funding agencies and society (Stanislavska, *et al*, 2014: Badat, 2010; Vasilescu *et al*, 2010: Chen, Nasongkhla & Donaldson, 2015). The stakeholder theory further explain that the corporation activities have the right and obligation to participate in directing it (Brusseau, 2012) affects whoever's life. As such, the HEIs are expected to pursue and embrace their ideologies and principles: even-handedness, excellence, development, democratization, academic liberty, institutional sovereignty, effectiveness, efficiency, and public accountability in the interest of all (DBSA, 2010).

Corporate Social Responsibility of Higher Education Institutions
Corporate Social Responsibility is not just limited to philanthropic responsibility, of the business, also, economic responsibility, legal responsibility as well as ethical responsibility were all considered as holistic approach to CSR (Brusseau, 2012; Vasilescu, Barna, Epure & Baicu, 2010). The CSR is globally underlined with come certain principles which can be compared with the values and principle set for HEIs in South Africa and establish the possibility of pursuing social responsibility within the community by universities despite been a public entity with autonomy power. Actually, education is regarded as one of the most powerful tool needed for the pursuit of the agenda of CSR by linking economic, societal and environmental to sustainable development strategy for national improvement (Chen, Nasongkhla & Donaldson, 2019). Further, Sham (2018) posits that "destroying any nation does not require the use of atomic bombs or the use of long range missiles. It only requires lowering the quality education and allowing cheating in the examination by students". This will destroy the entire governance system because it will be populated by mediocrities produced from such education system. This position is also in tandem with Rahman et al (2019). The impact of HEIs is illustrated in below figure 2:
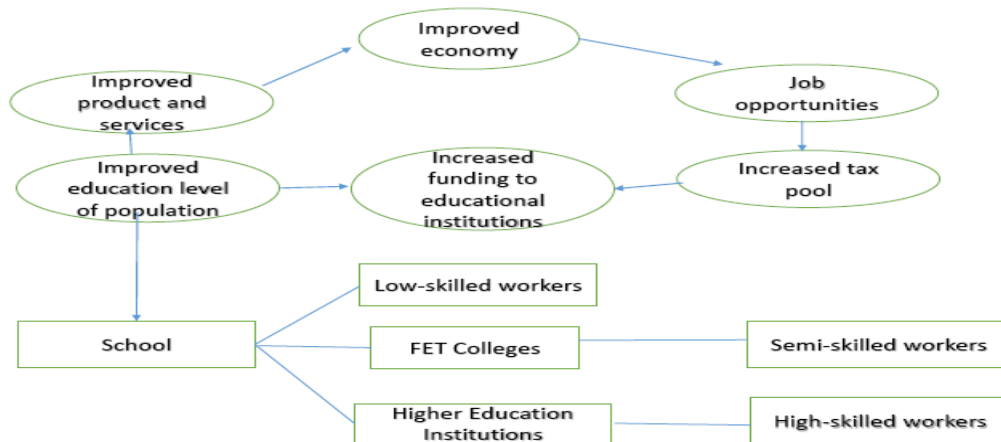
Figure 2: Illustration of HEIs impact on economy
Source: Adapted from (de Beer, Jacobs. Moolman & Zaaiman, 2016)

In line with the principles of CSR and the highlighted impacts of HEIs, below discussions is going to examine the relationship between the principles and how they impact on the university communities.

a. *Corporate social responsibility accountability and HEIs*

The objective of this principle is to ensure that corporate decision is taken in such a way that both organization and stakeholder's interest are put into consideration without having to deceive any of the parties (Jones, 2010). Accountability is usually described based on the context in which it is been used, however, in the context of CSR, triple bottom-line is regarded as the appropriate measure for corporation accountability. Whereby, an organization are expected to keep proper records of their economic, social and environmental activities (Brusseau, 2012; Mosunova, 2014; Yamamoto, 2011). In the past, business were only accountable to the shareholders, as time goes by the role changed and all stakeholders are entitled to reports, not just on finances but other activities of the organization that impacted on stakeholders. Yamamoto (2011) acknowledged that the merging of autonomy power and accountability granted HEIs has somehow subjected its operation to performance based funding. The performance are measured in term of graduate throughput and research articles published in accredited journals (Mohamed, 2015) and how these has impact on relevant stakeholders. HEIs are not excluded from being accountable to their stakeholders despite been a public entity. In the last four years South Africa Higher institution has been facing various challenges in term of undergraduate funding which was titled #feesmustfall. In a study done by (Inglesi-Lotz & Bohlmann, 2016) explained the ripple effect of fees must fall protest on the economy and labour marker. The analysis in the study showed that there might about 90% reduction in new skill labour entering into the market. This challenge has brought on board more stakeholders into limelight. HEIs has been forced to engage more with government, business, parent, and student formations to discuss way forward (Masweneng, 2017). In addition, the presence of universities in communities has brought about changes in social, economic and environmental structure of such communities due to influx of young people for learning purpose. University students do have a way of affecting the social dynamics of their host community either positively or negatively depending on individual perception of their presence (Moolman & Jacobs, 2018). Likewise, since universities are funded by taxpayer's money, hence, there is a serious need for an ongoing updates on their various activities on

regular basis especially the ones mandated by law such as demographic representation of workforce and given preference to deserving black learners. Actually, Mohamed (2015), suggested that responsibility is equal to accountability as per HEIs and its CSR operations

b. *Corporate social responsibility transparency and HEIs*

Despite the acclaimed academic freedom of HEIs, transparency and credibility is key to the appropriate management of its affairs. Right from inception universities has always been part of their host communities, and always seen and treated as one of the community entity (Die Arbeitgeber, 2009). Transparency with regard to CSR means disclosure of all relevant business information to stakeholder and ensure the business is devoid of corruption in any form. This could enhance the trust of employees, clients, community and other relevant stakeholders in the case of HEIs. The trust will establish the basis on which the stakeholder's conflict can be resolved amicably and successfully, attract and retain the best brain and promote the existing relationship in the right direction (Aggeri & Breton, 2016). According to (Vasilescu *et al*, 2010) stakeholders demand and expected increasing standard of accountability and transparency at all time. According to (Nwete, 2007) CSR is described as the obligation of business to support economic development in a sustainable manner, in partnership with employees and their families, local community and society in general to progress quality of life that supports the business and good for development.

c. *Corporate social responsibility ethical behaviour and HEIs*

Business ethics is a "form of applied ethics or professional ethics that examines the ethical principles and ethical problems which arise in a business environment" (Wlodzimierz and Szanto, 2018). Mohamed (2015) described corporate social responsibility in academics/university environment as social responsibility, which is showed as the policy of ethical quality of performance of the university community through accountable management to generate Sustainable Human Development. Vasilescu *et al*, 2010, has suggested numerous CSR effects of the HEIs, which are organizational, cognitive, social and educational effects. In support of this framework, Mcuddy, Anstett & Guest (n.d) designated ethical behaviour as what is accepted as good and right in the perspective of the governing moral code. Sometimes some things that seems legal may not be morally right. Hence, ethical behaviour is about striking a balance between legal and moral justifications. Unethical behaviours in HEIs can impact negatively on the thinking and moral of future leaders (Singh & Stuckelberger, 2017). Student that learned in the course of their study that situation can be manipulated to suit their own expected purpose will definitely cheat their way through in business after graduating from higher institution of learning. Hence, the need to instil ethical behaviour into learners is one way of HEIs involving in corporate social responsibility (Chen, Nasongkhla & Donaldson, 2015; Tormo-Carbo, Oltra, Segui-Mas & Klimkiewicz, 2016; Singh & Stuckelberger, 2017)). The HEIs itself has to have high ethical culture in how it relates with stakeholders just like other business organization, there is need to comply with recordkeeping and report on its activities as it impacts on society and environment. Ike (2017) acknowledged that education does not happen in isolation but through societal, environmental and human influences. Educational institutions should revisit their curriculum and engage in teaching, research and training that challenges the entire conscience of human.

There are various ethical issues in HEIs that can negatively impact on Corporate Social Responsibility all over the world and South Africa included. Collapse of multinational companies earlier in 21st century has raised a lot of questions and integrity on academic institutions that produced the likes of managers that were involved in corruption stories that surrounded the collapse of those companies (Stuckelberger, 2017). Likewise, in South Africa, student funding through NSFAS over the years has been characterised by lots of hiccups that created students unrest and protest. Administrators has been accused of malpractices. Communities has been place on

siege sometimes due to student unrest, life and business of the community has also been threatened in the course of the protest. The DHET policy on throughput of graduate has put educators under unnecessary pressure to increase the pass rate. In some cases underserving students marks are upgraded in other to meet the expected passed rate or the quality of the assessment questions and criteria are reduced to increase the pass rate (Jacobs & Moolman, 2018).

d. Stakeholders Interest and Corporate Social Responsibility

Stakeholders are basically categorised into two namely: primary and secondary stakeholders. The primary stakeholders have direct interest on the organization performance and manners in which the organization have conducted business. Meanwhile, the secondary stakeholders are indirectly affected by the organization through their actions (Saylor Foundation, n.d). Stakeholders might be a source of new ideas, innovations and opportunities for organization growth and development. However, the stakeholder interest concept of CSR was born out of the fact that any activities of an organization that endanger the live or property of others must have a dare consequence on the organization (Nikolova & Arsic, 2017). According to Kettune (2014), quality assurance document of the institutions must describe the level of interactions and relationships with all stakeholders in HEIs, especially the external stakeholders. The terms and conditions of engagement and involvement of stakeholders in HEIs affairs should be clearly stated in policy document. In addition, HEIs could collaborate with more stakeholders in order to generate funds for the administration of the institution. Stakeholders are not just people that contributed to the organization in one form or the other; people affected by the activities of the organizations are also regarded as stakeholders. For instance, in the case of HEIs, always a government gazette precede the establishment of HEIs in any community. In this document people that were likely to be involved and affected by the affairs of the institution are usually mentioned and mode of engagements with them.

5. Community Development Via CSR: Role of HEIs

The days when the government was seen as the exclusive social change agent and the total macro problem solver have become an obsolete thinking, as organizations are increasingly taking a larger role, actively contributing in social and community projects under the concept of Corporate Social Responsibility (CSR). The featuring part of HEIs CSR in Community Development (CD) used in this paper is every primary and secondary benefits received by the community because of social obligation of the HEIs to the general community and social system. In accordance with the espoused principles as stated by Bowens (2011), we signpost the collective roles of HEIs CSR in CD for developing countries:

a. Closer links between HEIs and Communities. Via CSR, the presence of HEI in the social structure is felt beyond the realm that HEI is a structure for job creation and production of services only. This felt social capital in the society is consequently essential for community development; thus, HEIs and host societies stays in perpetual concord.

b. Growing talents. HEIs with a progressive approach towards CSR can profit from their position and fortify their posture as an attractive establishment by making their guarantee part of their value proposition for would-be employees. Research has confirmed that when employees view their organization's commitment to socially answerable behaviour more favourably, they correspondingly gravitate to have attitudes that are more constructive in many other areas that associate with better performance. They have confidence in their organizations, to make out, recompense great service, and resolve apprehensions quickly. A stout confidence in senior administration as per CSRs, results to improved opinion of employees to HEIs, hereafter their persuasion and devotion to the sector. This is vital in acquiring and retaining skilful

employees in the HEIs. In relation to Community Development, HEIs personnel views would possibly result to a community that treats the HEI as a vital economic base in the society.

c.   *Transfer of Technology (TOT).* Closer ties help in TOT between host communities and HEIs. Barton (2007) posits that there are three mechanisms of technology transmission: the flow of human resources; the flow of public technology support; and the flow of private technology to host communities. TOT introduced by HEIs that is rooted in the CSR processes, would profit the targeted communities in many facets of their development.

d.   *Interdependency between Communities and HEI:* The close linkage observed between a HEI and community is a distinctive of CSR role in community development as it produces progress that is sustainable in the end. HEIs CSR ventures give backings to local organization and disadvantaged communities. This without reluctance leads community development in a sustainable manner.

e.   *Poverty Alleviation:* HEIs program may well focus on the underprivileged, helpless and susceptible groups in the communities they function. Via this partnership, they may perhaps galvanize other organizations to help the host communities in its struggle to lessen poverty and, henceforth, in developing the communities.

f.   *Information Coordination Function:* HEIs should produce evidence-based research and start developments that are paramount to their host communities with references from such research. For example, extra-large Information Tech companies in the United States assisted under-staffed police departments with information gathering and processing by connecting cameras with video processing capabilities in spaces where the crime rates were becoming very high (CSR@Intel, 2009). This is an instance of how technology companies implement CSR ingenuities, which correspondingly profit the community and support their business goals.

6. Conclusion

Previous literature have not investigated in detail how CSR should be focused towards skills and uplifting of previously disadvantaged persons in the South African Society. The COVID-19 pandemic have therefore presented a new vista for exploration as per the the workings of HEIs during this uncertainty. Furthermore, extant studies are silent on how operating doctrines that support development should be embedded int the CSR framework.

The general roles of corporate social responsibility (CSR) in community development revolve around the ways their responsibility is acknowledged by community of stakeholders and how they feel positive impacts. CSR have many functions, which are positive and they bring the effects of their actions to the community. For many HEI leaders, it is a challenge mostimes to know where their accountability should begin and end with reference to developing infrastructure, generating economic prospects, and giving access to core services. Nevertheless, experience has shown that long-lasting CSR solutions at any operational level are predicated on collaborations' amongst government, civil society and business. However, it should be noted that profits do matter in the triple bottom line, but not at the cost of social and environmental worries. Conversely, there can be dire costs of ignoring the TBL framework in the name of profits. A key challenge of the TBL, according to Elkington, is the challenge of evaluating the social and environmental bottom lines. Profit is fundamentally numerical, so it is easy to measure, but what constitutes social and environmental responsibility is to a certain degree subjective, which makes the evaluation difficult. For example, would a dollar measure the quantum of oil? Additionally, there is the concern of mingling varied elements. It is also problematic to change levers amongst priorities that are seemingly varied, make the most of financial returns while also doing the maximum good for society. Some establishments might struggle to balance deploying money and other resources, to all three bottom lines short of favouring one at

the expense of another. Most corporate social responsibility projects will not deliver an instant boost to HEIs financial performance, but implemented honestly and leveraged skilfully, they can bring positive publicity, enhance corporate reputation, and expand stakeholder engagement. This is in addition to giving HEIs, the contentment of knowing they have truly supported community development. The lack of transparency, neglection of the main business stakeholder and not introduction of criteria relative to the CSR outcome are key impediments to CSR in South Africa and most of developing countries that must be giving attention for progress in community development.

CSR of HEIs in most developing countries including South Africa differ because of context. Thus, this article posits that similar research should be steered on the discrepancies between methods implemented by HEIs in terms of emphases and configurations in Corporate Social Responsibility, the precise roles of Corporate Social Responsibility agendas to community and society. Specifically, the following recommendations are proffered:

1) The Corporate Social Responsibility of tertiary institutions, especially in South Africa should tend towards, skills and educational development of historically disadvantage people, creating employment opportunity for reasonable number of people within the local community.
2) Research focused on the workings of HEIs during the prevailing pandemic (COVID 19) and economic uncertainties would be invaluable. Nonetheless, HEIs should upbeat and acknowledge that moving to a balance of their financial books should not be at the expense of social goals that have obligation in keeping.
3) Change is a continuum and the HEIs globally are going through this process. Therefore, their responsibilities of learning and inquiries necessities a re-examination, with a view on the influence they make to the prosperity of their economic and social environs. Further, it is imperative that Educational programmes in emerging and developing countries should be organized in such a way that community wants will be met.
4) HEIs need to take part in cost-effective associations with several stakeholders and integrating their corresponding ideas and resolutions into their own management practices. Hence, HEIs need to make out these stakeholders and their desires before charting out priorities.
5) HEIs are encouraged to develop calculated trends and operating doctrines that guarantee sustainable performance and development. In such a process, the information learnt from the stakeholders and resultant inventions will allow the HEI to increase its performance in a way that will be sustainable in the long term. This will profit and add value, not only the institution, but also the stakeholders and society in general.

References

Accountancy SA (2001). The JSE SRI Index, http://www.accountancysa.org.za

Aggeri, F., & Breton, M. (2016). *The Regulation of Transparency in the Field of CSR: The Materialisation of an Ideal into Technologies of Government*. EGOS, Naples, Italy.

Agedelo, M., Johannsdottir, L., & Davidsdottir, B. (2019). A literature review of the history and evolution of corporate social responsibility. *International Journal of Corporate Social Responsibility,* 4(1), 1 https://doi.org/0.1186/s40991-018-0039-y

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Alzyoudi, S.A., & Bani-Hani, K. (2015). Social Responsibility in Higher Education Institutions: Application Case from the Middle East. *European Scientific Journal*, 11(8), 122-129.

Astrie, K., Gatot, Y., & Yuni, R.B. (2014). Development path of Corporate Social Responsibility Theories. *World Applied Science Journal (innovation challenges in multidisciplinary research and practice),* 30(17), 110-120.

Badat, S. (2010). *The Challenges of Transformation in Higher Education and Training Institutions in South Africa.* Development Bank of Southern Africa.

Barton, J.H. (2007). *New Trends in Technology Transfer: Implications for National and International Policy,* Issue Paper No. 18. Geneva: International centre for Trade and Sustainable Development (ICTSD).

Benneworth, P., & Arbo, P. (2006). *Understanding the regional contribution of higher education institutions: a literature review*. Paris: OECD/IMHE.

Bryson, J.M. (2004). What to do when Stakeholders Matter: stakeholder identification and analysis techniques. *Public Management Review*, 6(1), 21-53.

Bowens, R. (2011). Understanding the ISO 26000 Social Responsibility Standard and How it relates to and can be Assessed Alongside other Standards. A Discussion about Social Responsibility Issues and how they can be managed within Business for the Benefit of Society Today and in the Future. SGS.

Brusseau, J. (2012). Business Ethics. Available online at https://2012books.lardbucket.org/books/business-ethics/index

Christopher, M., Payne, A., & Ballantyne, B. (2002). *Relationship Marketing: Creating Stakeholder Value* 2nd revised edition, Oxford, Butterworth-Heinemann).

CSR@Intel 2009. Does Technology have a role in Community Development? Available at http://blogs.intel.com/csr/2007/06

Chen, S., Nasongkhla, J., & Donaldson, J. (2015). University Social Responsibility (USR): Identifying an Ethical Foundation within Higher Education Institutions. *The Turkish Online Journal of Educational Technology*, 14(4), 165-172.

De-Beer, E., Jacobs, L., Moolman, A., & Zaaiman, R. (2016). #Feesmustfall and beyond: Towards a Sustainable Student Loan Regulatory Framework-NWU View.

Dekker, A. & Esser, I. (2008). The Dynamics of Corporate Governance in South Africa: Broad Based Black Economic Empowerment and the Enhancement of Good Corporate Governance Principles. *Journal of International Commercial Law and Technology*, 3(3) http://www.jiclt.com

DHET 2010. *Report on the Stakeholder Summit on Higher Education Transformation*. Available online at www.cput.ac.za/storage/services/transformation/he_transformation_summit_report.pdf

Donaldson, T., & Preston, L. (1995). The stakeholder theory of the corporation: Concepts, evidence, and implications. *Academy of Management Review*, 20(1), 65-91.

Fasoulis, I., & Kurl, R. (2018). Determinants to the implementation of corporate social responsibility in the maritime industry a quantitative study. *Journal of International Maritime, SA Environmental Affairs, and Shipping,* 10–20.

Freeman, R.E. (1984). *Strategic Management, A stakeholder approach*. Boston: Pitman Press

Frynas, J.G. (2005). The false development promise of Corporate Social Responsibility: evidence from multinational oil companies. *International Affairs,* 81(3), 581-598.

Girdzijauskaite, E., Radzeviciene, A., & Jakubavicius, A. (2019). Impact of international branch campus KPIs on the university competitiveness: FARE method. *Insights into Regional Development*, 1(2), 171-180. https://doi.org/10.9770/ird.2019.1.2(7)

IODSA, (2016). The King IV Report on Corporate Governance for South Africa 2016. Johannesburg: Institute of Directors Southern Africa.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Inglesi-Lotz, R., & Bohlmann, H. (2016). South Africa's economy would take a knock if starved of new graduates. Available online at http://theconversation.com/south-africas-economy-would-take-a-knock-if-starved-of-new-graduates-66578

Jerkins, H., & Ogbara, L. (2008). Corporate social responsibility in the mini ng industries. The risk of community dependency. CCRP Queens University Belfast http://www.ccrconference.org

Jones, R. (2013). *Corporate Governance and Accountability*. "In Corporate Governance-Synthesis of Theory, research and Practice, edited by Ronald Anderson and Kent Baker, 559-576.

Jongbloed, B, Enders, J, & Salerno, C 2007. *Higher education and its communities: interconnections and interdependencies in higher education*. Looking forward: Themes on the Changing Relationship between Higher Education and Society. European Science Foundation.

Kettle, D. (2002). *The Transformation of Governance: Public Administration for Twenty-First Century America* (Baltimore, MD: Johns Hopkins University Press).

Kekana, M., & Kubheka, T. (2016). Shutdown of Universities will have 'Devastating Effects'. Speech delivered by Advocate Thuli Madonsela at Ahmed Kathrada Lecture in Johannesburg. Available online at https://ewn.co.za/2016/10/16/Shutdown-of-universities-will-have-devastating-effects

Khanyile, M. (2018). Essentiality of Stakeholder Management for University Survival. Available online at http://www.journals.ac.za/index.php/sajhe/article/view/1789/1846

Kettunen, J. (2014). The Stakeholder Map in Higher Education, *Society, Education and Psychology*, 78, 34-38. https://doi.org/10.7763/IPEDR.V78.7

Mabelebele, J. (2015). HE in South Africa: Emerging Challenges & Implication for Universities. Available online at https://www.pwc.co.za/en/assets/pdf/he-conference_the-future-of-higher-education-in-south-africa.pdf

Lin, T.C.W. (2018). Incorporating Social Activism, *Boston University Law Review*, 1535, https://ssrn.com/abstract=3294317

Masweneng, K. (2017). Zuma's fee-free education does not tackle Fees Must Fall. Available online at https://www.timeslive.co.za/politics/2017-12-19-zumas-fee-free-education-does-not-tackle-fees-must-fall/

Moolman, A., & Jacobs, L. (2018). Responses to the Short-Term effect of the Zero Percent fee increase of South African Universities. *South African Journal of Higher Education*. 32(1), 172-191.

Mohamed, A. (2015). A Framework for University Social Responsibility and Sustainability: The Case of South Valley University, Egypt. *International Journal of Economics and Management Engineering,* 9(7), 2407-2416.

Mosunova, N. (2014). The Content of Accountability in Corporate Governance. *Russian Law Journal*, 11(3), 116-129.

Nikolova, V., & Arsic, S. (2017). The Stakeholder Approach in Corporate Social Responsibility. *Engineering Management,* 3(1), 24-35.

Nwete, B. (2007). Corporate Social Responsibility and Transparency in the Development of Energy and Mining Projects in Emerging markets: Is Soft Law the Answer? *German Law Journal,* 8(4), 311-340.

Nwoba, M., & Michael, U. (2016). Community Development and Corporate Social Responsibility in Ebonyi State: An Investigation Study of Selected Mining Firms and Communities. *Journal of Policy and Development Studies*, 10(2), 54-62.

Pang, O.L., May, Chrystal, S.N., Ying-Kai, O. Shannon R.W., & Kristle P.Y. (2018). Utilization of CSR to build organizations' corporate image in Asia: need for an integrative approach, *Asian Journal of Communication,* 28(4), 335-359.

Peters, B. (1996). *The Future of Governing: Four emerging models* (Lawrence, KA, University Press of Kansas).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Porter, M., & Kramer, M. (2011) Creating Shared Value: How to reinvent capitalism-and unleash a wave of innovation and growth. *Harvard Business Review*, January-February.

Rahman, A., Castan, P., & Love T. (2019). Corporate Social Responsibility in Higher Education. A Study of Institutionalisation of CSR in Malaysian Public Universities

Ramdass, K. (2009). The Challenges facing Education in South Africa. Paper presented at the Higher Education Conference on the Impact of Mergers on South African Higher Education System. Tshwane University of Technology, 2-7 October 2009.

Reiss, R. (2017) Top CEOs Place High Value on Corporate Ethics and Social Responsibility to Drive Business. https://www.forbes.com/sites/robertreiss/2017/09/11/top-ceos-place-high-value-on-corporate-ethics-and-social-responsibility-to-drive-business/#1cff9e794473

Rutterford, J., Upton, M., & Kodwani, D. (2006). *Financial Strategy*: Adding Stakeholder Value, 2nd edition, Chichester, John Wiley & Sons).

SAICA, https://www.saica.co.za

Shu-Ling, H. (2018). The Effects of Corporate Social Responsibility on Corporate Image, *International Journal of Social Sciences and Humanities Invention*, 5(05), 4693-4703.

Solomons, N.M. (2013). *The Role of Corporate Social Investment Initiative in South Africa Education.* Unpublished Master's Thesis. North-West University.

Stanislavska L, Kvasnicka R, Kuralova K., & Margarisova K. (2014). Social Responsibility of Higher Education Institutions- The Comparison of the vie of Students and Potential Students. *Journal on Efficiency and Responsibility in Education and Science*, 7(3-4), 95-99.

Singh D., & Stuckelberger, C. (2017). Ethics in Higher Education Value-driven Leaders for the Future. Globeethics.net Education Ethics, 1

Sustainability South Africa. King II Report on Governance in South Africa and King III report. http://www.sustainabilitysa.org

Tormo-Carbo G, Oltra, V, Segui-Mas E., & Klimkiewicz, K. (2016). How effective are Business Ethics .*CSR courses in Higher Education Advances, HEAd'16 21-23* June 2016, Valentia, Spain

Vasilescu, R., Barna, C., Epure, M., & Baicu, C. (2010). Developing University Social Responsibility: A model for the Challenges of the new Civil Society. *Procedia Social and Behavioural Sciences,* 2, 4177-4182.

Włodzimierz, S., & Szántó, R. (2018) Corporate Social Responsibility and Business Ethics in Controversial Sectors: Analysis of Research Results. *Journal of Entrepreneurship, Management and Innovation*, 14, 111-126. https://doi.org/10.7341/20181435

Yamamoto, K., 2010. Educational and Public Accountability of Higher Education Institutions in Case of National Universities in Japan. *The Journal of Management and Policy in Higher Education*, 1-19.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Dr. Christiana KAPPO-ABIDEMI is a Senior lecturer at the School of Development Studies, Faculty of Economics, Development & Business Sciences; University of Mpumalanga, South Africa. She holds a Doctorate, in Human Resource Management. She has worked and published in the areas of Human Resources and Public Administration, which are the areas of her expertise.
ORCID ID: orcid.org/0000-0001-9559-0514

Ogujiuba KANAYO holds a PhD in Development Economics and is a faculty member at the School of Development Studies, Faculty of Economics, Development & Business Sciences; University of Mpumalanga, South Africa. His research has attracted citations from many other articles. He is currently working on several Entrepreneurship papers at the Centre for Entrepreneurship Rapid Incubator based at the University of Mpumalanga, South Africa. He has worked and published in the areas of Development Policy and Macroeconomics, which are part of his research focus areas.
ORCID ID: orcid.org/0000-0001-9155-7039

ENTREPRENEURSHIP AND SUSTAINABILITY CENTER

Publisher
http://jssidoi.org/esc/home

enterprise europe network
Business Support on Your Doorstep

OASPA

Scopus®

Web of Science

Clarivate Analytics

RESEARCH ON THE EFFECT FACTORS OF TECHNICAL PERFORMANCE ON SMEs BY INDUSTRIAL SECTORS*

Seok-Soo Kim

Graduate School of Knowledge Service Consulting, Hansung University, P. O. Box 136-792, 16th Street, Samseonggyo-ro, Seongbuk-gu, Seoul, Korea

E-mail: ssjm4475@gmail.com

Abstract. This study's research question is that there will be a crucial element in improving business performance among SMEs' success variables and competencies. Significantly, there should be different variables for performance in industry sectors. 1) The success variables of SMEs vary widely, but four characteristics of technology, management, commercialization, and exit strategies were selected. 2) The mediator is a technology innovation and technology marketing function. 3) The dependent variables are technical, financial, and non-financial performance. Previous literature had problems studying only the effects of each of the three variables, so we established a hypothesis and research model that focused on causality studies linking them. According to the data group analysis result for 3330 CEOs of SMEs, the six industries' performance impact factors were different. As a result of comparative analysis of changes in performance impact by industry, it was found that the largest increase in Information Technology (IT)/Software (S/W), Life/Food, and Crafts sectors. The key research finding is that it has verified the essential elements of critical performance improvement. We provided that different success variables and competencies differ in performance across industries. The results are expected to contribute to SMEs' CEO and government policymakers' practical applications, support organizations, academia, and industry.
.

Keywords: entrepreneurial performance; entrepreneurial competency; SMEs; technical performance; effet factor; technology commercialization

---

1. Introduction

This study examined the concepts of entrepreneurs' success variables and entrepreneurs' competencies that can enhance technology-based SMEs' business success to revitalize the technology-based entrepreneurship ecosystem. Besides, by analyzing the impact and analyzing the impacts' characteristics, we verified the impacts of the success factors on the entrepreneurial competency and identified the correlations. To achieve this goal, we reviewed the problems and limitations of previous studies through literature review and then explored the factors to derive, analyze, and evaluate the core factors. Theoretical research systematically analyzed previous studies related to the Technical Performance and influential factors of technology start-up companies that have been studied in Korea and abroad. In particular, this study examined the effects of technology start-up companies' success variables on the technology marketing capability and technology innovation capacity, which are the mediating effects of technology startup capability. Also, we verified the impact of the technology startup success variables on the business performance of technology startup companies, set up a research model, and performed research on the effects through Smart PLS.

The survey subjects were 330 start-up companies' CEO and conducted online surveys in six industries, types of manufacturing, and gender, and 205 questionnaires were collected and used for empirical analysis. For statistical analysis, SPSS 22 was used for basic statistical analysis. The results were presented using Smart PLS3.2.9 for evaluation and significance evaluation of the research model's measurement and structural models. We Investigated the components of entrepreneurs' ability to perform entrepreneurship under poor entrepreneurship conditions and evaluated their influence to improve their ability and capacity for success of start-ups based on the characteristics of the entrepreneurs' capabilities and the conditions of their establishment. Creating and expanding business performances by linking core competencies and starting a business to successful start-ups is an important task.

We reviewed previous studies to identify problems and limitations and select variables. Success variables have been studied in various ways. However, in this study, technology, management, commercialization, and exit strategies have been selected because they are essential success variables for companies. The mediation variables are SMEs' technology marketing competency and technology innovation competency, which affect performance and verify the mediating effect on performance. The dependent variables are financial performance, non-financial performance, and Technical Performance, which are indicators of performance. The objectives of this study are as follows. First, the causal relationship between the success variables of SMEs on competence and performance. Second, the effect of success variables on performance through the mediating effect of competency. Third, the effect of competency on performance. Fourth, the effect on the performance of six industries including electrics/electronics, machinery/parts, IT/SW, chemicals/textiles/materials, life/food, crafts/others. The reason for selecting six industrial classifications is that, since 2001, the Korea Startup Promotion Agency has been operating a business support policy by designating six industrial classifications of small and medium-sized startups.

2. Theoretical background

Previous research on technology-based SMEs: Technology-based startups and ventures already play a significant role in developing the national economy and serve as a growth engine for industrial innovation (Autio 1997; Kortum and Lerner 2001). A company focused on R and D or using new technical knowledge or knowledge (Cooper, Williard and Woo 1986). In Korea, it is classified into technology-based startups, ventures, and general startups according to the type of startup of the Small and Medium Business Administration and the Korea Startup Association. Small and medium-sized startup companies are identified as new technology-based companies that

have just been established. Within seven years, which mainly corresponds to the manufacturing and knowledge service industry, the Small and Medium Business Startup Support Act defines a company within seven years after its establishment as a startup company. In a similar sense, it means a new SME that is technology-intensive as a venture company. It is also recognized as a result of high-tech or new technology-based startups with high risk and high-profit potential. However, the definition is similar because the distinction is not clear. Examples include spin-offs, technology-based spin-offs, new technology-based companies, research-based ventures, and high-tech startups (De Cleyn and Braet 2009). In another respect, research-based startups are defined as new business startups that develop and sell new products or services based on proprietary technologies, and research, development, innovation, exports, and employment. In this regard, small and medium-sized startups have contributed to the economy and have played a key role in bringing new technologies to the market (Heirman and Clarysse 2004). A small and medium-sized start-up company means a start-up based on the entrepreneur's skills, experience, and expertise, and is also called a start-up technology. The United States recognizes that technology-based start-ups are accompanied by personal and collective assets associated with advances in scientific and technical knowledge to create and maintain value (Bailetti 2012).

In Korea, as of April 2019, according to the 2018 Entrepreneurship Research Results Report, there were 2,030,987 small and medium-sized startups. The organization type was 89.0% for individual entrepreneurs and 11.0% for corporate entrepreneurs. The distribution of organizational form by industry was high for individual entrepreneurs from 1st to 7th year. Corporate entrepreneurs were found to maintain similar levels at around 10%. The start-ups in one year accounted for the largest portion with 24.3%, followed by 20.6% in 2 years, 16.0% in 3 years, 12.6% in 4 years, 10.2% in 5 years, 8.8% in 6 years, and 7.5% in 7 years. In terms of 18 major categories, 26.5% of the wholesale and retail industries were the highest, followed by 25.8% of the lodging and restaurant industry, 8.9% of the manufacturing industry, and 7.8% of repair and other personal service industries (Start-up Promotion Agency 2019).

The results of researching previous studies on the performance of SMEs can be summarized as follows. The effect of management ability on financial performance was studied (Kim and Seo 2017). The effects on technology competency, Technical Performance, and management performance were also studied (Lee I.K 2016). However, the previous studies were limited to each of the influence variables. Also, only the success variable's management performance was studied in part, and there was no study on the mediating effect of SMEs' competency. Overall, the previous study was only to identify success variables for management performance and individual relationships of competencies. Therefore, some problems and limitations cannot determine the causal or dynamic relationship between variables.

The specific purpose of this study is as follows. First, the causal relationship examined empirically, the effects of the technology startup success variables on capability, and the Technical Performance of technology startup companies. Second, this study empirically analyzed the effect of the technology startup success variables on technology performance through the mediating effect of technology startup capability. Third, we empirically identified the effect of technology entrepreneurship capability on technology start-up companies' Technical Performance. Fourth, empirically analyzed the influence factors of technology startup success variables on technology performance by using Partial Least Square-Structural Equation Modeling (PLS-SEM), a statistical analysis technique, and causal relationship. Fifth, identified the impact factors affect business performance in six industries such as electrics/electronics, machinery/parts, IT /SW, chemicals/textiles/materials, life/food, crafts, and other industries. The moderating effect of differences performance was confirmed using Data Group Analysis.

This study's differences are summarized as follows: 1) The success variable, an independent variable, was selected as four sub-factors. Management performance, a dependent variable, was selected as three sub-factors: technical performance, financial performance, and non-financial performance. 2) As a parameter, a sub-factor of competency, the effect on business performance was studied by selecting technology innovation competency and technology marketing competency. 3) The relationship between the entrepreneur's business and the impact on management performance according to industry was compared and verified.

3. Theory and hypotheses

As we looked at the effect of success variables on the SMEs' competency and management performance in the theoretical background: it has been found that previous studies have failed to comprehensively study potential influence variables such as management ability, technical ability, exit strategy, technology commercialization competency, and technical marketing competency. Therefore, in this study, the success variables were studied not only on the effect on corporate competency and business performance but also on SMEs' competency in management performance.

We established three hypotheses to test these research topics. Technical expertise and management skill were studied as factors influencing SMEs' innovation capability and competitiveness (Hwang, Choi and Shin 2020). The research model suggested that technological competence will have a positive (+) effect on the core competency of small and medium-sized entrepreneurs. (Kim, Cho and Lee 2020). According to entrepreneurs, six startup success factors were studied (Prohorovs, Bpositively 2019). Therefore, the success variables expected to affect the entrepreneurs' ability to be studied sporadically in previous studies were summarized as external factors such as entrepreneurship education, government support, and investment were excluded. In this study, it was necessary to study the entrepreneurs' success and technical factors as factors that influenced entrepreneurs' success, excluding external factors. Therefore, there is a need to verify the effect of SMEs' competency on technology and management. For this reason, entrepreneurs propose the following hypothesis.

Hypothesis 1. Entrepreneurial success variables will have a positive effect on competency.

As an independent variable, the effect of corporate competencies on the success of business incubators was studied (Pauceanu, Alpenidze, Edu and Zaharia 2019). The dynamic competencies positively impact the business performance of start-ups was presented (Seo and Lee 2019). An empirical study on the effect of technology commercialization competency on management performance, technical competency, and marketing competency as a control variable for technology commercialization competency as independent variables was studied (Park and Yang 2018). An empirical research model on the impact of performance and technology commercialization competency was presented (Bae, Song and Kim 2018). Technology innovation and commercialization competencies studied the effect of management performance (Kim and Park 2018). Therefore, the necessary competencies that affect performance as the number of mediating success variables need to focus on technological competencies and verify their effectiveness. The reason was that it was necessary to test the hypothesis that in order to create business results, there would be necessary variables that mediate success factors. External factors such as entrepreneurship, government support, and investment were excluded. As a mediator of entrepreneurs' success, excluding external influences, it was necessary to focus and study the technical factors. Therefore, there is a need to verify the performance impact on the technical side. For this reason, the following hypothesis was proposed.

Hypothesis 2. SMEs' competencies will have a positive impact on performance.

The effect of SMEs' CEO technology competency on management performance was studied (Lee I.K. 2016). A research model was presented on the impact of technological competency on management performance (Yoon, J.H. 2018). Knowledge and networks in the global start-up process study suggested a network (Englis, Wakkee and Van Der Sijde 2007). The effect of core competencies and network competencies on SMEs' management performance was studied (Kim and Bang 2017). An effect of network competency on technological innovation capability and innovation performance was studied (Kim, J.Y. 2017). Therefore, it was found that the success variables affecting business performance were studied from various perspectives. In this study, it was divided into a management perspective and a technical perspective. In terms of management, it is necessary to categorize it into four sub-factors: management and exit strategies, technical ability, and technical commercialization ability, to verify the effectiveness. The reason is that to create business results, and it is difficult to identify the effect factors without excluding external factors. As a variable of success for entrepreneurs, it was necessary to study focusing on technology and management factors, excluding external influences. Therefore, the following hypothesis was proposed.

Hypothesis 3. Success variables will have a positive effect on Technical Performance.

The conceptual research model is shown in Figure 1.
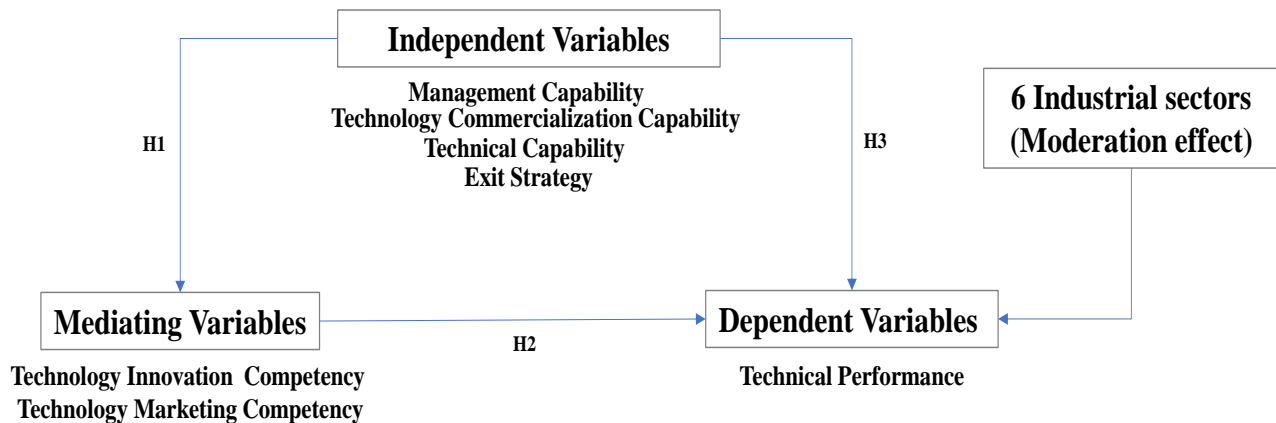
Figure 1. Conceptual research model

Studies on differences in performance and impact according to SMEs' industrial classification were not found in previous studies. It is very commercially meaningful in that it can provide a realistic and feasible alternative. This study confirmed whether there is a difference in the size of the impact on the industry sector's business performance. Using Data Group Analysis (DGA) to validate the differences in competency and business performance across six industries is a unique and differentiated point from previous studies. The final structural study model is shown in Figure 2.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
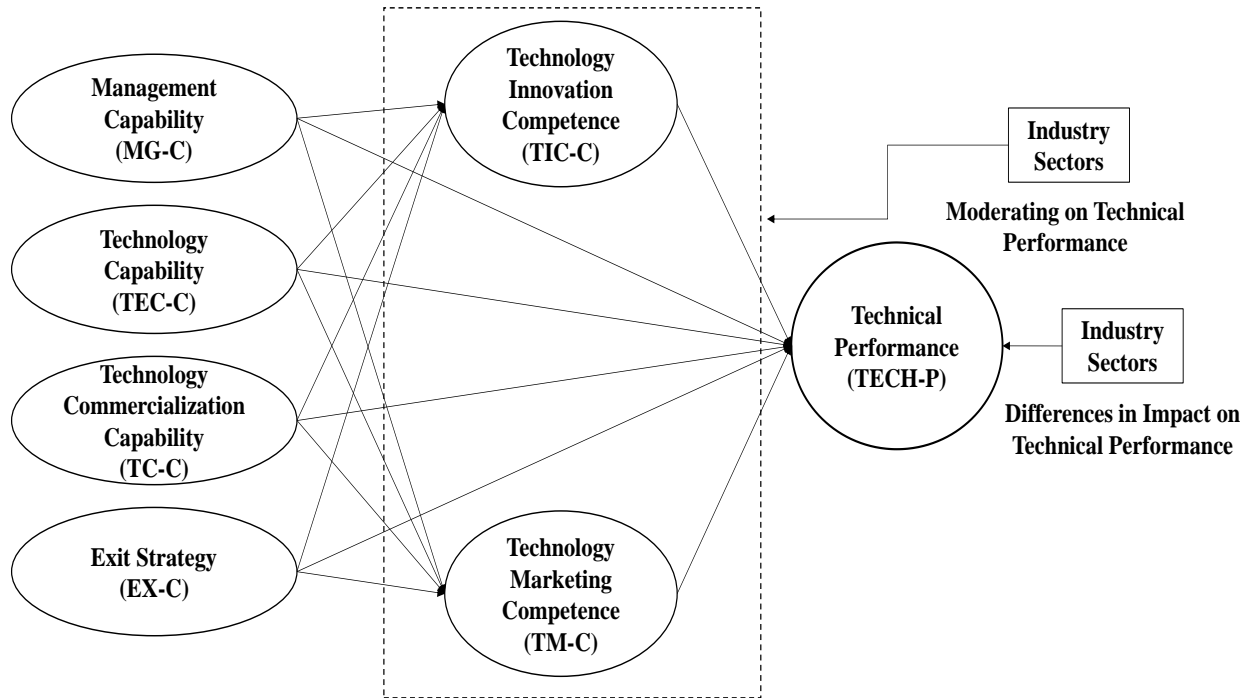
Figure 2. Final structural research model

4. Materials and methods

The data was collected using an online questionnaire method for 330 CEOs of SMEs based on manufacturing. The questionnaire was collected from 205 CEOs, and the response rate was 62%. SMEs are less than five years after the start-up. The industrial sector is six fields defined in Korean start-up company classification criteria: electrics/electronics, machinery/parts, IT/SW, chemicals/textiles/materials, life/food, crafts/others. The 5-point scale was used to measure the questionnaire. The collected data were analyzed and verified along with the basic statistics and measurement and structural models by SPSS 22 and Smart PLS 3.2.9. Among the collected data, insignificant measurement indicators were removed through factor analysis. To confirm the reliability and validity required for evaluating the reflex measurement model, the internal consistency reliability, convergence validity, and discriminative validity were evaluated by running the PLS algorithm. The internal consistency reliability was evaluated by Cronbach's α, Dijkstra-Henseler's rho$_A$, and Composite Reliability (CR). Outer loadings, measurement variable reliability, evaluated the convergent validity, Average Variance Extracted (AVE). Discriminant validity in a reflective measurement model was assessed using Fornell-Larcker Criterion (FLC), cross-loading (Hair et al. 2017).

The model of this study consisted of a reflective measurement model consisting only of reflective indicators. The collected data were analyzed first using SPSS, and the analysis of factors was used to remove insignificant measurement indicators. In this study, internal consistency reliability, concentration validity, and discriminant validity were analyzed and evaluated. Cronbach's α, Dijkstra-Henseler's rho$_A$, and Composite Reliability (CR) of internal consistency reliability assessment are criteria for evaluating internal consistency reliability, and Average Variance Extracted (AVE) is a criterion for evaluating concentration validity. If the AVE square root of the diagonal is larger than the correlation between the study variables below the diagonal, the discriminant validity

between the study variables is evaluated. For the evaluation results and interpretation of the reflective measurement model, Fornell-Larcker Criterion was used for external loading, measurement variable reliability, AVE value, Cronbach's α, rho_A, Composite Reliability (CR), and discriminant validity. PLS-SEM performs Bootstrapping and Blindfolding to evaluate the reflected structural model and verify the hypothesis, and then verify and analyze the multicollinearity, coefficient of determination (R^2), effect size (f^2), and predictive suitability (Q^2). Finally, we confirmed that the structural model was suitable and evaluated the path coefficient's significance and the model's suitability. Lastly, by introducing industry-specific variables, we confirmed the difference in influence by industry. By verifying the influence on the moderating effect on business performance as a dependent variable, we confirmed that this study's model was suitable and found that it had a moderating effect.

The demographic characteristics are as follows. The gender distribution was 66.8% for men and 33.2% for females, respectively, and the proportion of males was 60.5% for a private company and 39.5% for corporate companies. In the industry sectors, electrics/electronics 18.5%, machinery/parts 14.8%, IT/SW 17.6%, chemicals/textiles/materials 17.6%, life/food 12.7%, and crafts/others 19.0%. Regarding the number of years of respondents' start-ups, 32.2% was less than two years or less than three years, 32.2% was less than one year, or less than two years, less than 7.3%, more than five years 4.9%. Looking at the sales volume of t,he previous year, less than 0.1 million $ was the highest with 35.1%, followed by 32.2% from 0.1 million $ to less than 0.3 million $, 22.0% from 0.3 million $ to less than 0.5 million $, and less than 0.5 million $ to 1 million $ 9.3 %, 1 million $ or more 1.3%. In terms of the manufacturing method, outsourcing and in-house manufacturing accounted for the largest share at 62.0%, outsourcing 22.9%, and 15.1%. In terms of the number of employees, less than three people were the most 46.3%, more than three and less than six people were 39.0%, more than five and less than ten people were 13.7%, more than ten people were 1.0%. By age group, the 30s were the highest with 40.0%, the 40s were 38.5%, the over 50s were 12.7%, and the 20s were 8.8%.

Independent variables

Management ability
As a study on the manager's psychological characteristics, it means that creative innovation that enables the development of new products, technologies, and procedures through new ideas, development, and research and development through innovation of management characteristics (Franco, Hope and Lu 2017). Research on management ability is significant because it can explain the relationship between the manager's differences and management performance more systematically and concretely than research based on its characteristics. The evaluation of observable management ability can give the company's manager a direction for the company's development. Early-stage SMEs are not precisely organized, so there is a limit to creating results based on the organization's capabilities. Although management abilities vary from time to time in each study, technical competence, strategic thinking ability, and organizational competency are considered to be very important in common (Andreou, Karasamani, Louca and Ehrlich 2017).

Technical ability
Technical ability is an essential resource for promoting and supporting a company's innovation strategy and sustainable success and as an important result of innovation activities (Burgelman and Sayles 2004). The company's technical ability was presented in seven categories: learning ability, R and D ability, resource allocation ability, production ability, organizational ability, and strategic planning ability (Yam et al. 2004).

Technology commercialization ability
In a narrow sense, technology commercialization is limited to how products or services are created after the basic research or development stage, which is a technology development activity. New technologies acquired through own research and development or external procurement can be defined as a continuous process from prototype manufacturing, pilot production, mass production system construction, marketing, and sales activities to link actual production and sales (Nevens 1990). It has been reported that systematic technological innovation ability and technology commercialization ability affect management performance by revealing that a long-term strategic plan is being made (Booz, Allen and Hamilton 1982).

Exit strategy ability
A study was conducted on the exit strategies of SME managers (Kim, S.Y 2014). The venture company's EXIT strategy and cases by type were studied (Kwon, O.H 2009). An empirical study was conducted on business commercialization and technological innovation on management performance (Bae, H.B., Song, M.K., and Kim, S.G 2018).

Mediating variables

Technology innovation competency
Technology innovation competency is critical that leads to the continuous growth of a company. At the same time, it is a characteristic of a comprehensive company that promotes and supports technological innovation (Burgelman, Christensen and Wheelwright 2008). On the other hand, it was analyzed that the relationship between R and D investment level and business performance was negative or not at all (Coombs and Bierly 2006). In a study of the technological innovation system framework and the entrepreneur's view of innovation, the technological innovation system-generated valuable insights into the processes that need stimulation for the successful development and implementation of innovative sustainability technologies (Planko, Cramer, Hekkert, and Chappin 2017). It has been shown whether innovation capacity positively affects the company's performance (Saunila 2017).

Technology marketing competency
Viewing the results of the analysis of the success or failure of technology development, marketing's importance is reduced. In other words, 20 ~ 40% of the technical failures are due to defects in the technology itself (Miller and Power 2005). A rest is due to the lack of marketing competency, especially in high-tech products, due to the lack of marketing competency reaching 75% (Clugston 1995). The concept of technology marketing is interpreted differently depending on the researcher and expressed in two ways. As a unique research area of marketing, it is a high-tech product marketing that sells or purchases products with technology-typed products through marketing techniques.

Dependent variables

Technical Performance
Technical Performance has a relatively large effect on technical and technical management competency, production support, marketing competency, research and development competency, and new product development competency. It has a significant impact on market information as well as business performance. It is said that the securing of superior technology can directly act as a determinant of investment by venture capital or other

investment companies because it is directly related to the growth or profits of venture companies (Johannisson 1986).

5. Results

Evaluation of the measurement model

The evaluation of the research model's measurement model was carried out using the PLS Algorithm of Smart PLS 3.2.9 to analyze and evaluate internal consistency reliability, concentration validity, and discriminant validity. PLS path modeling was developed by Wold (1982), which is essentially a regression sequence in the form of a weight vector. The weight vector obtained at convergence satisfies the fixed-point formula (Dijkstra 2010). The PLS Algorithm execution basic setting for evaluating the reflective measurement model was performed using the path weighting method, the maximum repetition 1000 times, and the stopping criterion set to 10^{-7}. Internal consistency reliability was assessed by Cronbach's Alpha, Dijkstra-Henseler's rho$_A$, and Composite Reliability (CR). The convergent validity by outer-loadings, measurement variable reliability, and AVE. The results are shown in Table 1.

Table 1. Evaluation results of the reflective measurement model

Type of variables	Latent variable*	Convergent validity			Internal consistency reliability			Discriminant validity
		Outer loadings	Measurement variables reliability	AVE	Cronbach's Alpha	Dijkstra-Henseler's rho$_A$	Composite reliability (CR)	Cross loadings
		>0.7	>0.5	>0.5	0.5~0.9	>0.7	0.5~0.9	
Independent variable	EX-C	0.952	0.905	0.905	0.895	0.895	0.950	Yes
	MG-C	0.937	0.877	0.877	0.860	0.860	0.935	Yes
	TC-C	0.867	0.751	0.831	0.797	0.800	0.908	Yes
	TEC-C	0.912	0.831	0.752	0.917	0.919	0.938	Yes
Dependent variable	TECH-P	0.868	0.753	0.754	0.836	0.835	0.902	Yes
Mediating variable	TIC-C	0.912	0.831	0.748	0.887	0.888	0.922	Yes
	TM-C	0.876	0.767	0.767	0.899	0.902	0.929	Yes

The abbreviation of latent variables* is as follows. Management Capability (MG-C), Technology Capability (TEC-C), Exit Capability (EX-C), Technology Commercialization Capability (TC-C), Technology Innovation Competency (TIC-C), Technology Marketing Competency (TM-C), Technical Performance (TECH-P).

Convergent validity was assessed by outer loadings, measurement variable reliability, and AVE. The measurement variables' external loads were all over the threshold of 0.7, indicating a concentration validity. The results of external loading and cross-loading analysis are shown in Tables 2 and 3.

Tables 2. Evaluation results of measurement model (outer loadings)

Type of variables	Latent variables	Indicators	EX-C	MG-C	TC-C	TEC-C	TECH-P	TIC-C	TM-C
Independent variable	EX-C	ES1	0.951						
		ES2	0.952						
	MG-C	MC2		0.937					
		MC4		0.936					
	TC-C	TC1			0.828				
		TC2			0.894				
		TC3			0.883				
		TC4			0.889				
		TC6			0.839				
	TEC-C	TCC1				0.905			
		TCC2				0.919			
Mediating variable	TIC-C	TIC10						0.885	
		TIC11						0.856	
		TIC12						0.879	
		TIC3						0.839	
	TM-C	TM13							0.849
		TM2							0.890
		TM6							0.881
		TM8							0.883
Dependent variable	TECH-P	TP1					0.890		
		TP2					0.823		
		TP3					0.890		

As shown in Table 1, the Average Variance Extracted (AVE) value, which is another criterion of the concentration validity, also confirmed that the convergent validity was secured as all the measured variables were

the threshold value of 0.5 or more. Fornell-Larcker Criterion (FLC), Cross Loadings are presented as criteria for determining the reflective measurement model's discriminant validity. FLC is a criterion for determining discriminant validity. Since the square root of the AVE of the diagonal is larger than the correlation between the study variables below the diagonal, the discriminant validity between study variables is evaluated. The results are shown in Table 4.

Tables 3. Evaluation results of measurement model (cross-loadings)

Latent variables	Indicators	EX-C	MG-C	TC-C	TEC-C	TECH-P	TIC-C	TM-C
EX-C	ES1	0.949	0.747	0.682	0.608	0.580	0.671	0.533
	ES2	0.954	0.666	0.648	0.658	0.575	0.682	0.564
MG-C	MC2	0.656	0.906	0.744	0.634	0.606	0.601	0.470
	MC4	0.744	0.902	0.781	0.646	0.553	0.648	0.588
TC-C	TC1	0.469	0.752	0.480	0.645	0.614	0.477	0.383
	TC2	0.641	0.731	0.950	0.636	0.559	0.571	0.608
	TC3	0.688	0.782	0.952	0.660	0.596	0.598	0.629
	TC4	0.690	0.644	0.565	0.645	0.562	0.887	0.623
	TC6	0.602	0.513	0.498	0.588	0.554	0.892	0.580
TEC-C	TCC1	0.631	0.588	0.513	0.629	0.576	0.909	0.625
	TCC2	0.600	0.657	0.601	0.651	0.520	0.864	0.625
TIC-C	TIC10	0.633	0.640	0.613	0.841	0.652	0.646	0.627
	TIC11	0.417	0.562	0.488	0.852	0.662	0.553	0.495
	TIC12	0.550	0.633	0.560	0.826	0.666	0.592	0.572
	TIC3	0.483	0.545	0.495	0.781	0.615	0.458	0.467
TM-C	TM13	0.638	0.685	0.654	0.803	0.710	0.645	0.523
	TM2	0.610	0.698	0.667	0.872	0.726	0.668	0.512
	TM6	0.581	0.603	0.526	0.834	0.754	0.561	0.491
	TM8	0.484	0.556	0.501	0.834	0.651	0.562	0.509
TECH-P	TP1	0.533	0.598	0.479	0.700	0.880	0.605	0.478
	TP2	0.576	0.658	0.640	0.763	0.884	0.566	0.619
	TP3	0.402	0.436	0.374	0.592	0.761	0.379	0.308

Tables 4. Evaluation results of the measurement model

Latent variables	EX-C	MG-C	TC-C	TEC-C	TECH-P	TIC-C	TM-C
EX-C	0.952						
MG-C	0.748	0.937					
TC-C	0.609	0.632	0.912				
TEC-C	0.733	0.705	0.656	0.867			
TECH-P	0.769	0.847	0.664	0.820	0.868		
TIC-C	0.704	0.716	0.676	0.785	0.793	0.865	
TM-C	0.722	0.708	0.601	0.786	0.848	0.797	0.876

Evaluation of the structural model

The structural model's evaluation can be seen as a procedure to confirm the research model designed and developed by the researcher and confirm that the structural model is suitable. Once the structural model is found to be a suitable model, hypothesis testing can be performed. This study evaluated and confirmed multicollinearity, coefficient of determination (R^2), effect size (f^2), and predictive suitability (Q^2) for evaluation of structural model in PLS-SEM. Table 5 shows the verifying of the internal VIF value by executing the PLS algorithm to confirm multicollinearity. If the Inner VIF Values among the study variables are less than 5, it can be judged that there is no multicollinearity. As a result, all of them are less than 5, so it can be estimated that there is no multicollinearity. Evaluate the explanatory power of the endogenous research variables, the results of verifying the coefficient of determination R^2 by executing the PLS algorithm are shown in Table 6. The effect size (f^2) is used as a criterion for evaluating the relative influence of exogenous study variables (or predictors or independent variables) on the endogenous study variables. If f^2 is 0.02, it is evaluated as a small effect size, 0.15 as a medium effect size, and 0.35 as a big effect size. Table 7 shows the results of checking the effect size (f^2). Evaluate whether the structural model has predictive suitability for specific endogenous study variables. For this purpose, predictive suitability (Q^2) is used. If the structural model is Q^2 greater than 0 for a specific endogenous study variable, it is predicted to be predictive fit. Blindfolding of Smart PLS 3.2.9 was performed to confirm the results of Cross-Validated Redundancy and to evaluate Q^2. The results are shown in Table 8.

Tables 5. Inner VIF

Type of variables	Indicators	TECH-P	TIC-C	TM-C
Independent variable	EX-C	2.992	2.852	2.852
	MG-C	2.915	2.731	2.731
	TC-C	2.106	1.979	1.979
	TEC-C	3.659	2.714	2.714
Mediating variable	TIC-C	3.804		
	TM-C	3.634		

Tables 6. R square

Type of variables	Indicators	R Square	Adjusted R Square
Dependent variable	TECH-P	0.863	*0.858*
Mediating variable	TIC-C	0.696	*0.690*
	TM-C	0.682	*0.675*

Tables 7. Effect size(f^2)

Type of variables	Indicators	TECH-P	TIC-C	TM-C
Independent variable	EX-C	0.004	0.017	0.046
	MG-C	0.380	0.048	0.044
	TC-C	0.004	0.063	0.003
	TEC-C	0.077	0.221	0.254
Mediating variable	TIC-C	0.003		
	TM-C	0.225		

Tables 8. Predictive suitability(Q^2)

Type of variables	Indicators	Q^2
Independent variable	TECH-P	0.623
Mediating variable	TIC-C	0.509
	TM-C	0.508

Verification of hypotheses

Since the structural model's evaluation is appropriate, the hypothesis verification can be carried out through bootstrapping. The significance and adequacy of the path coefficient are evaluated using the t value calculated through the execution of bootstrapping. Through this, a hypothesis test was conducted. Bootstrapping of Smart PLS 3.2.9 carried out the significance and suitability evaluation of the path coefficients. It was verified by checking the t-value, p-value, and confidence interval required for hypothesis testing at the significance level of .05. The results are shown in Tables 9 and Figure 3.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Tables 9. Hypothesis verification results

Hypothesis	Path	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ($|O/STDEV|$)	P-value	Confidence interval 2.5%	97.5%	Significance (p<0.05)
H1	EX-C→TM-C	0.204	0.208	0.098	2.086	0.037	0.003	0.396	Yes
	MG-C→TIC-C	0.200	0.203	0.081	2.465	0.014	0.042	0.359	Yes
	TC-C→TIC-C	0.195	0.191	0.075	2.588	0.010	0.043	0.333	Yes
	TEC-C→TIC-C	0.427	0.433	0.089	4.817	0.000	0.251	0.591	Yes
	TEC-C→TM-C	0.469	0.467	0.111	4.238	0.000	0.244	0.684	Yes
H2	TM-C→TECH-P	0.335	0.333	0.086	3.890	0.000	0.161	0.501	Yes
H3	MG-C→TECH-P	0.390	0.379	0.062	6.281	0.000	0.277	0.517	Yes
	TEC-C→TECH-P	0.196	0.192	0.083	2.369	0.018	0.047	0.361	Yes

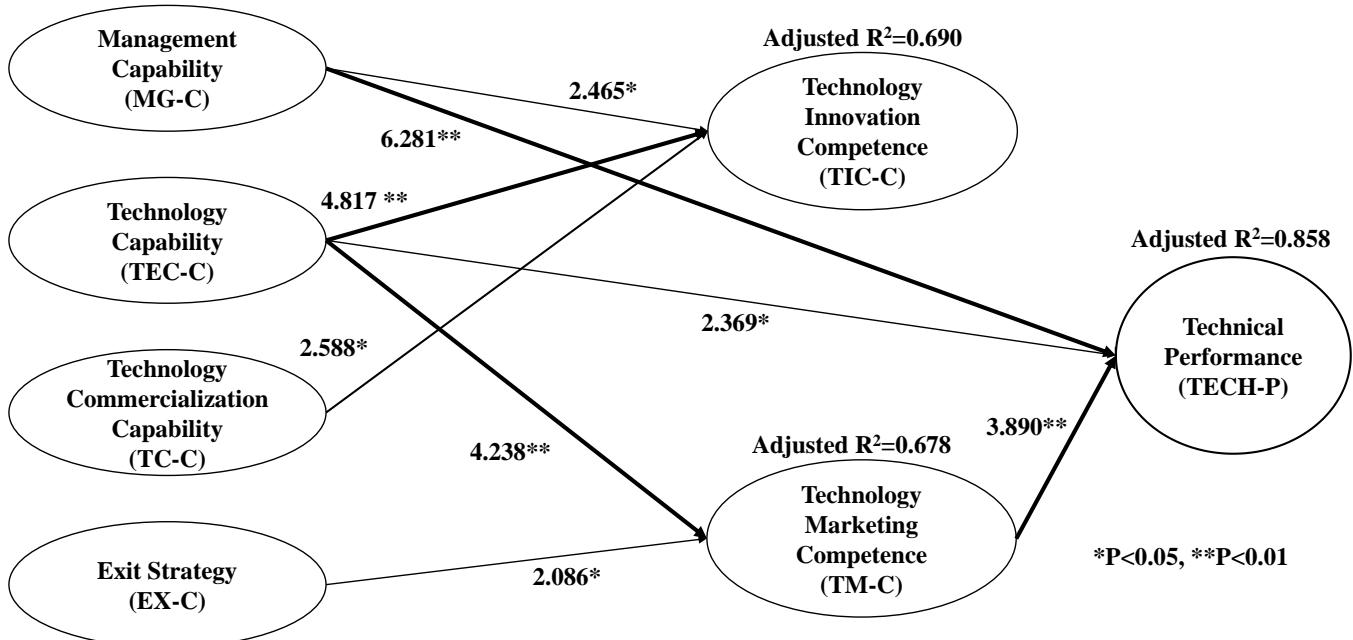**Figure 3.** Hypothesis verification result (T-value/P-value)

As a result of hypothesis verification, as shown in Tables 9 and Figure 3, the critical and significant paths are as follows. *Hypothesis 1:* Technology capability (TEC-C) had a significant influence on both technical marketing (TM-C) and technological innovation capability (TIC-C). *Hypothesis 2:* Technical marketing competency (TM-C)

strongly influenced technical performance (TECH-P). *Hypothesis 3:* MG-C→TECH-P, Management Capability (MG-C) strongly influenced technical performance (TECH-P).

Moderation effect verification

According to the industrial classification, the moderation effect on the Technical Performance was significant with the path coefficient of .114, the T-statistic of 1.782, and the P-Value of .075 (p <.10). The results are shown in Tables 10 and Figure 4.

Tables 10. Verification results of moderation effect

Hypothesis	Path	Original Sample	Sample Mean	Standard Deviation	T statistics	P-Value	Significance
		(O)	(M)	(STDEV)	(|O/STDEV|)		(p<0.10)
H1	EX-C →TM-C	0.204	0.207	0.099	2.067	0.039	Yes
	MG-C →TIC-C	0.200	0.203	0.082	2.442	0.015	Yes
	MG-C →TM-C	0.195	0.193	0.114	1.712	0.087	Yes
	TC-C →TIC-C	0.195	0.192	0.074	2.645	0.008	Yes
	TEC-C →TIC-C	0.427	0.433	0.091	4.682	0.000	Yes
	TEC-C →TM-C	0.469	0.470	0.110	4.253	0.000	Yes
H2	TM-C →TECH-P	0.337	0.326	0.087	3.863	0.000	Yes
H3	TEC-C →TECH-P	0.399	0.393	0.085	4.689	0.000	Yes
	EX-C →TECH-P	0.123	0.139	0.067	1.841	0.066	Yes
	MG-C →TECH-P	0.437	0.429	0.071	6.153	0.000	Yes
Moderation	TC-C→DIV→TECH-P	0.114	0.122	0.064	1.782	0.075	Yes
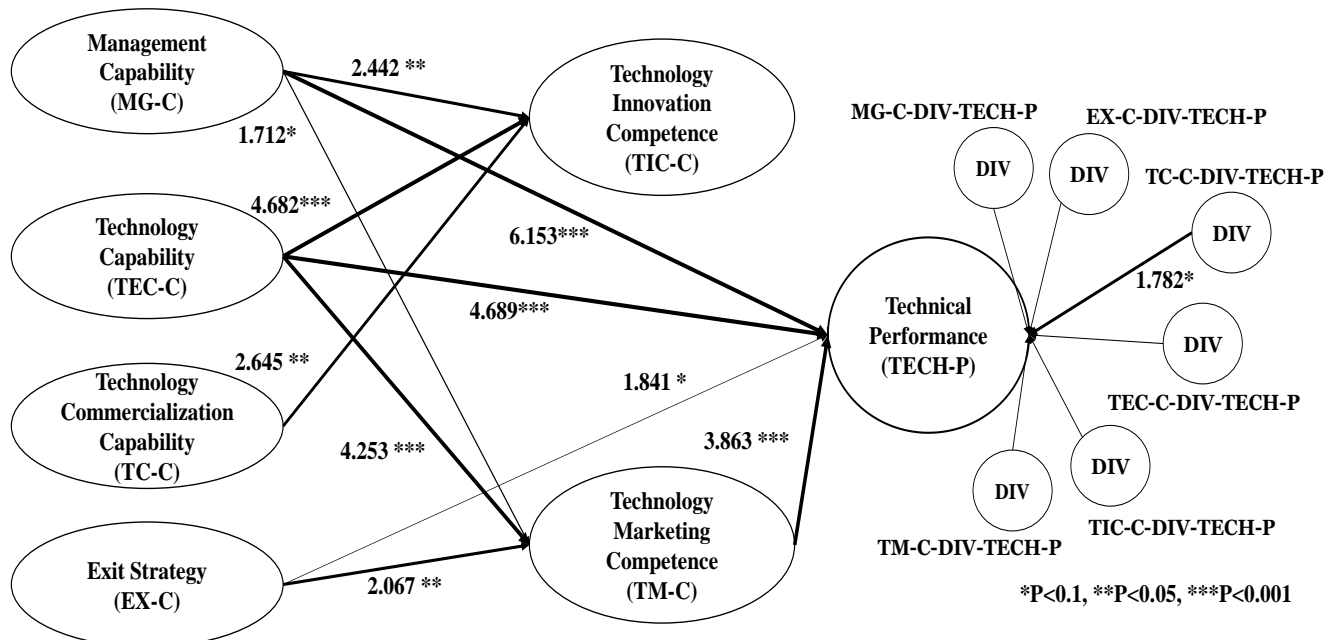
Figure 4. Moderation effect verification result (T-value, P-value)

As shown in Table 10 and Figure 4, it was confirmed that the impact factors on technical performance differ by industry. In particular, technology commercialization capability affects technical performance due to the moderating effect of industrial classification. This result proved the study's purpose that the influence factors showing the modulating effect will differ depending on the industry sector. A data group analysis was conducted to verify what latent variables have different effects depending on the industry sector and whether there are differences between industries.

Analysis result of technical performance impact by industry sectors

We compared and verified the differences between R^2, f^2, total indirect effects, specific indirect effects, and total effects on the Technical Performance impacts of six industries. Six industries are DIV 1 (electrics/electronics), DIV 2 (machinery/parts), DIV 3 (IT/SW), DIV 4 (chemicals/ textiles/ materials), DIV 5 (life/food), DIV 6 (crafts/others). We used Data Group Analysis to identify differences in Technical Performance according to six industry classification. The results are shown in Tables 11 to 15.

Table 11. R^2 Result of technical performance impact by industry sectors

Adjusted Square	Overall*	DIV 1**	DIV 2**	DIV 3**	DIV 4**	DIV 5**	DIV 6**
TECH-P	0.858	0.810	0.896	0.868	*0.905*	*0.960*	0.897
TIC-C	0.690	0.719	0.681	0.796	0.616	*0.901*	*0.753*
TM-C	0.675	0.600	0.765	*0.814*	0.560	0.626	0.723

Table 12. f^2 Result of technical performance impact by industry sectors

f^2	DIV 1			DIV 2			DIV 3		
	TECH-P	TIC-C	TM-C	TECH-P	TIC-C	TM-C	TECH-P	TIC-C	TM-C
EX-C	0.002	0.040	0.011	0.286	0.029	0.121	0.010	0.342	0.001
MG-C	0.190	0.162	0.332	*1.334*	0.069	0.001	0.000	0.050	0.032
TC-C	0.034	0.220	0.019	0.272	0.235	0.004	0.190	0.061	0.001
TEC-C	0.097	0.270	0.291	0.005	0.184	0.390	0.249	0.625	1.065
TIC-C	0.025			0.014			0.025		
TM-C	0.333			0.056			0.009		

Table 13. f^2 Result of technical performance impact by industry sectors(continued)

f^2	DIV 4			DIV 5			DIV 6		
	TECH-P	TIC-C	TM-C	TECH-P	TIC-C	TM-C	TECH-P	TIC-C	TM-C
EX-C	0.023	0.017	0.093	0.116	0.073	0.142	0.085	0.141	0.435
MG-C	0.401	0.040	0.136	*1.304*	0.260	0.001	0.281	0.001	0.050
TC-C	0.003	0.047	0.002	0.098	0.119	0.003	0.114	0.086	0.024
TEC-C	0.001	0.159	0.201	*0.577*	0.289	0.038	0.103	0.485	0.087
TIC-C	0.129			0.041			0.001		
TM-C	0.237			*2.412*			**0.986**		

Table 14. Total indirect effect of technical performance impact by industry sectors

Total Indirect Effect	Overall	DIV 1	DIV 2	DIV 3	DIV 4	DIV 5	DIV 6
				TECH-P			
EX-C	0.074	0.074	-0.021	0.053	-0.061	-0.076	0.261
MG-C	0.074	0.074	*0.253*	0.017	0.045	*0.205*	-0.058
TC-C	0.023	0.023	0.081	0.048	0.029	-0.059	0.005
TEC-C	0.174	0.174	0.234	0.184	0.027	*0.252*	0.085

Table 15. Special indirect effect of technical performance impact

Special Indirect Effect	Overall	DIV 1	DIV 2	DIV 3	DIV 4	DIV 5	DIV 6
EX-C→TIC-C→TECH-P	0.005	0.022	-0.017	-0.062	0.036	-0.027	0.006
MG-C→TIC-C→TECH-P	0.008	0.041	0.023	0.031	0.058	-0.037	-0.001
TC-C →TIC-C→TECH-P	0.008	0.039	0.038	0.027	-0.047	-0.023	0.005
TEC-C→TIC-C→TECH-P	0.017	0.049	0.048	*0.127*	*0.100*	-0.048	0.013
EX-C→TM-C→TECH-P	0.069	-0.043	0.070	0.002	-0.112	*0.288*	*0.283*
MG-C→TM-C→TECH-P	0.066	*0.213*	-0.006	0.015	0.146	-0.021	0.099
TC-C→TM-C→TECH-P	0.015	0.042	0.010	0.002	-0.012	0.027	0.072
TEC-C→TM-C→TECH-P	0.157	0.185	0.137	-0.100	0.152	0.133	0.145

Table 16. Total effect of technical performance impact by industry sectors

Total Effect	Overall			DIV 1			DIV 2			DIV 3		
	TECH-P	TIC-C	TM-C	TECH-P	TIC-C	TM-C	TECH-P	TIC-C	TM-C	TECH-P	TIC-C	TM-C
EX-C	0.114	0.122	0.204	0.010	0.157	-0.100	0.427	-0.174	0.309	0.009	-0.427	-0.016
MG-C	0.464	0.200	0.195	0.547	0.291	0.497	0.624	0.230	-0.025	0.044	0.210	-0.159
TC-C	0.058	0.195	0.046	-0.016	0.278	0.098	-0.222	0.383	0.045	0.292	0.184	-0.020
TEC-C	0.371	0.427	0.469	0.432	0.350	0.433	0.133	0.483	0.602	0.650	0.868	1.080
TIC-C	0.041			0.140			0.099			0.146		
TM-C	0.335			0.427			0.227			-0.092		

Table 17. Total effect of technical performance impact by industry sectors(continued)

Total Effect	DIV 4			DIV 5			DIV 6		
	TECH-P	TIC-C	TM-C	TECH-P	TIC-C	TM-C	TECH-P	TIC-C	TM-C
EX-C	0.040	0.196	-0.485	0.084	0.213	0.579	0.133	0.258	0.480
MG-C	0.726	0.321	0.634	0.390	0.291	-0.042	0.339	-0.024	0.168
TC-C	-0.025	-0.258	-0.051	0.109	0.179	0.055	0.241	0.217	0.122
TEC-C	0.223	0.547	0.660	0.451	0.376	0.267	0.354	0.548	0.246
TIC-C	0.182			-0.127			0.024		
TM-C	0.231			0.496			0.589		

In Table 11, R^2 shows that DIV 1 (electrics/electronics) has a low impact on Technical Performance from .858 to .810, but increases in all other DIV 2 ~ DIV 6. In Tables 12 and 13, f^2 shows that factors affecting Technical Performance differ according to DIV, which means that learning and education methods that improve existing uniform abilities and competencies to create technological outcomes according to industries are different. Differently, it is essential to know that specialized education and learning for each industry sector is required. In Table 14, the total indirect effects were found to increase technological capability on Technical Performance except DIV 4 (chemicals/textiles/materials) and DIV 6 (crafts/others).

In Table 15, the Special Indirect Effect on Technical Performance is significant except for DIV 3 (IT/SW) and DIV 6 (crafts/others) when the technical capability is through the technology marketing capability. Electronics confirmed an increase in indirect effects. Besides, the exit strategy (EX-C) increased significantly in DIV 5 (life/food) and DIV 6 (crafts/others) via technology marketing. Overall, the technology marketing competency (TM-C) confirmed that the Special Indirect Effect was high. In Tables 16 and 17, the total effect on the Technical Performance was found to be increased in three or more factors: DIV 3 (IT/SW), DIV 1 (electrics/electronics), and DIV 5 (life/food). In particular, DIV 3 (IT/SW) found that the total effect of technology capability, technology innovation capability, and technology commercialization capability on technology performance was remarkably increased. It proves to be an essential factor for IT/SW companies to increase their Technical Performance.

6. Conclusions and implications

Given that young SMEs' success in the world is one of the essential policies for each country's future survival, this study examined the causal relationship between the degree and influence of factors affecting entrepreneurial capability and the influential drivers and technical performance.
We analyzed and verified whether the mediation effect is significant, and the impact on the business performance of six industries such as electrics/electronics, machinery/parts, IT/SW, chemicals/textiles/materials, life/food, crafts/others.

The moderating effects of how the factors differ and the degree of influence were verified. In particular, due to verifying the moderating effect on the industry sector's technical performance, it was confirmed that the technology capability is the main influence factor path on technical performance. As for the total effect on the Technical Performance, it was confirmed that DIV 3 (IT/SW), DIV 1 (electrics/electronics), and DIV 5 (life/food) increased the total effect on three or more factors. Mainly, DIV 3 (IT/SW) found that the total effect of technology capability, technology innovation capability, and technology commercialization capability on technology performance was remarkably increased. It proves to be an essential factor for IT/SW companies to increase their technical performance. In the information technology industry and the SoftWare industry, we are trying to survive and grow in the rapidly developing IT environment by making efforts to enhance technology capability, innovation capability, and technology commercialization capability by using Digital Transformation to create the technological performance.

This study suggests overcoming the failure of SMEs' technical performance and which capability and competence in focusing on sustainability. Management capability and technical marketing competency were an important, influential driver for technical performance. Technology capability had a significant influence on both technical marketing and technological innovation capability. This study's results will be provided to government policymakers and practitioners of government support agencies to stimulate youth entrepreneurs' success.

The limitations of this study and future research subjects can be summarized as follows.
First, this study was conducted for the founding companies. However, the significant technology start-up companies' technical field was found in electronics/electronics, machinery/parts, IT/SW, chemicals/textiles/materials/, life/food, and crafts/others. In setting up the surveys into two fields, there was a failure to subdivide all possible technology fields to which technology start-up companies belong. In the future, it will be necessary to conduct further research on the technical fields that have been subdivided with the specification of the technical fields. Second, there was a practical limitation that the former founders could not be targeted in the part of the research that was limited to the youth founding academy in Korea. We will carry out future research as a research topic to include a broader range of founders, including technology startups by country, region, industrial complex, and industry. Third, some of the contents of the questionnaire conducted in this study were focused on the manufacturing field, so there were practical limitations that it was difficult to reflect as many diverse and technical founders as possible.

Groups of technologies in the future can be categorized into manufacturing, non-manufacturing, IT, and industry 4.0, or the eight projects included in the innovation growth performances and future plans jointly announced by related ministries as reporting items for the Korea Innovation Growth Conference. It is necessary to expand further to the core leading business and conduct further research, and to conduct future research as an in-depth research topic following this research.

References

Andreou, P. C., Karasamani, I., Louca, C., and Ehrlich, D. 2017. The impact of managerial ability on crisis-period corporate investment. *Journal of Business Research* 79: 107-122. https://doi.org/10.1016/j.jbusres.2017.05.022

Autio, E. 1997. New, technology-based firms in innovation networks symplectic and generative impacts. *Research policy 26*(3): 263-281. https://doi.org/10.1016/S0048-7333(96)00906-7

Bae, H., Song, M., and Kim, S. 2018. A Study on the Impact of Competency of Technology: Based Startups on Performance Using ETRI Technology. *Asia-Pacific Journal of Business Venturing and Entrepreneurship 13*(1): 61-72.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Bailetti, T. 2012. Technology entrepreneurship: overview, definition, and distinctive aspects. *Technology Innovation Management Review 2*(2): 5-12. http://doi.org/10.22215/timreview/520

Bollinger, L., Hope, K., and Utterback, J. M. 1983. A review of literature and hypotheses on new technology-based firms. *Research policy 12*(1): 1-14. https://doi.org/10.1016/0048-7333(83)90023-9

Booz, and Allen and Hamilton. 1982. *New products management for the 1980s*. Booz, Allen and Hamilton.

Burgelman, R. A., and Sayles, L. R. 2004. Transforming invention into innovation: the conceptualization stage. *Strategic Management of Technology and Innovation. McGraw-Hill, Boston*, 682-690.

Burgelman, R. A., Christensen, C. M., and Wheelwright, S. C. 2008. *Strategic management of technology and innovation. McGraw-Hill/Irwin.*

Carland, J. W., Hoy, F., Boulton, W. R., and Carland, J. C. 1984. Differentiating small business owners from entrepreneurs. *Academy of Management Review 9*(2): 354-359. https://doi.org/10.5465/ AMR. 1984. 4277721

Chandler, G. N., and Hanks, S. H. 1994. Market attractiveness, resource-based capabilities, venture strategies, and venture performance. *Journal of Business Venturing 9*(4): 331-349. https://doi.org/10.1016/0883-9026(94)90011-6

Chandler, G. N., and Jansen, E. 1992. The founder's self-assessed competence and venture performance. *Journal of Business Venturing 7*(3): 223-236. https://doi.org/10.1016/0883-9026(92)90028-P

Clugston, C. O. 1995. High-Tech demands own new-product plan. *Electronic news 41*(2094): 33-36.

Coombs, J. E., and Bierly III, P. E. 2006. Measuring technological capability and performance. *R& D Management 36*(4): 421-438. https://doi.org/10.1111/j.1467-9310.2006.00444.x

Cooper, A. C., Willard, G. E., and Woo, C. Y. 1986. Strategies of high performing new and small firms: A reexamination of the niche concept. *Journal of Business Venturing 1*(3): 247-260. https://doi.org/10.1016/0883-9026(86)90003-0

De Cleyn, S. H., and Braet, J. 2009. Research valorisation through spin-off ventures: Integration of existing concepts and typologies. *World Review of Entrepreneurship, Management and Sustainable Development 5*(4): 325-352. https://doi.org/10.1504/WREMSD.2009.031624

De Franco, G., Hope, O. K., and Lu, H. 2017. Managerial ability and bank-loan pricing. *Journal of Business Finance and Accounting 44*(9-10): 1315-1337. https://doi.org/10.1111/jbfa.12267

Dijkstra, T. K. 2010. Latent variables and indices: Herman Wold's basic design and partial least squares. *In Handbook of Partial Least Squares* (pp. 23-46). Springer, Berlin, Heidelberg.

Englis, P. D., Wakkee, I., and Van Der Sijde, P. 2007. Knowledge and networks in the global startup process. *International Journal of Knowledge Management Studies 1*(3/4): 497-514. https://doi.org/10.1504/IJKMS.2007.012538

Fischer, E., and Reuber, A. R. 2003. Support for rapid-growth firms: a comparison of the views of founders, government policymakers, and private sector resource providers. *Journal of Small Business Management 41*(4): 346-365. https://doi.org/10.1111/1540-627X.00087

García-Muiña, F. E., and Navas-López, J. E. 2007. Explaining and measuring success in new business: The effect of technological capabilities on firm results. *Technovation 27*(1-2): 30-46. https://doi.org/10.1016/j.technovation.2006.04.004

Guan, J., and Ma, N. 2003. Innovative capability and export performance of Chinese firms. *Technovation 23*(9): 737-747. https://doi.org/10.1016/S0166-4972(02)00013-5

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., and Thiele, K. O. 2017. Mirror, mirror on the wall: a comparative evaluation of composite-based structural equation modeling methods. *Journal of the Academy of Marketing Science 45*(5): 616-632.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Heirman, A., and Clarysse, B. 2004. How and why do research-based start-ups differ at founding? A resource-based configurational perspective. *The Journal of Technology Transfer 29*(3-4): 247-268. https://doi.org/10.1023/B:JOTT.0000034122.88495.0d

Hwang, W. S., Choi, H., and Shin, J. 2020. A mediating role of innovation capability between entrepreneurial competencies and competitive advantage. *Technology Analysis and Strategic Management 32*(1): 1-14. https://doi.org/10.1080/09537325.2019.1632430

Itami, H., and Numagami, T. 1992. Dynamic interaction between strategy and technology. *Strategic Management Journal 13*(S2): 119-135. https://doi.org/10.1002/smj.4250130204

Johannisson, B. 1986. Network strategies: management technology for entrepreneurship and change. *International Small Business Journal*, *5*(1): 19-30. https://doi.org/10.1177/026624268600500102

Kim, J. Y., and Bang, H. Y. 2017. The Effects of Environmental Uncertainty on the Impact Strategy and Performance of Korean, US, and Japanese Firms: Focusing on Environmental Uncertainty in the Competition Sector. *Korean Journal of Trade and Commerce* 17(4): 135-156.

Kim, J., Cho, J., and Lee, S. 2020. The Influence of Entrepreneurial Competences on Corporate Performance of Technology-based Start-ups. *Journal of the Industrial Management System 43*(1): 132-142. http://db.koreascholar.com/article.aspx?code=388698

Kim, K. C., and Suh, B. D. 2017. The Effects of Social Enterprise Characteristics and CEO's Management Capability on Business Performance: Focusing on Mediating Effects of Corporate Reputation. *The Journal of Eurasian Studies 14*(2): 47-80.

Kim, S.Y. 2014. *A Study on the Corporate Exit Strategy of the owners of small and medium-sized enterprises - focused on the business succession of small and medium-sized enterprises.* Master's Thesis, Sangmyung University.

Kim, Y. K., and Park, S. T. 2018. Effects of Absorptive Capacity on Technology Innovation and Commercialization Capacities and Management Performance. *Journal of the Korea Convergence Society 9*(12): 217-225. https://doi.org/10.15207/jkcs.2018.9.12.217

Kwon, O.H. 2009. *Venture company's EXIT strategy and case study by type.* Master's Thesis, Konkuk University.

Kortum, S., and Lerner, J. 2001 Does venture capital spur innovation? i Libecap, GD (red.) Entrepreneurial inputs and outcomes; New studies of entrepreneurship in the United States. Bingley: Emerald Group Publishing Limited.

Lall, S. 1992. Technological capabilities and industrialization. *World Development 20*(2): 165-186. https://doi.org/10.1016/0305-750X(92)90097-F

Larsson, E., Hedelin, L., and Gärling, T. 2003. Influence of expert advice on expansion goals of small businesses in rural Sweden. *Journal of Small Business Management 41*(2): 205-212. https://doi.org/10.1111/1540-627X.00076

Lee, I. K., and Yang, D. W. 2016. An Empirical Study on the Effect of CEO Technological Capability on Management Performances: Focusing on mediating effect technological capability in SMEs. *Asia-Pacific Journal of Business Venturing and Entrepreneurship 11*(2): 167-182.

Miller, P., and Power, M. 2005. Calculating corporate failure. *In Professional Competition and Professional Power* (pp. 65-90). Routledge.

Nevens, T. M. 1990. Commercializing technology: what the best companies do. *Planning review.*

Pauceanu, A. M., Alpenidze, O., Edu, T., and Zaharia, R. M. 2019. What determinants influence students to start their own business? Empirical evidence from United Arab Emirates Universities. *Sustainability 11*(1): 92. https://doi.org/10.1080/14735903.2012.674400

Park, H.G., and Yang, D.W. 2018. An Empirical Study on the Effect of the Technological Commercialization Ability of the Initial Entrepreneurship on Management Performance: Focusing on the Moderating Effect of Technology Entrepreneurs in Manufacturing Industries. *Journal of the Korean Entrepreneurship Society 1*(1): 14.

Planko, J., Cramer, J., Hekkert, M. P., and Chappin, M. M. 2017. Combining the technological innovation systems framework with the entrepreneurs' perspective on innovation. *Technology Analysis and Strategic Management 29*(6): 614-625. https://doi.org/10.1080/09537325.2016.1220515

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Prohorovs, A., Bistrova, J., and Ten, D. 2019. Startup Success Factors in the Capital Attraction Stage: Founders' Perspective. *Journal of East-West Business 25*(1): 26-51.

Ritter, J. R. 1984. The hot issue market of 1980. *Journal of Business* 57, no. 2 (April): 215-240.

Saunila, M. 2017. Innovation capability in achieving higher performance: perspectives of management and employees. *Technology Analysis and Strategic Management 29*(8): 903-916. https://doi.org/10.1080/09537325.2016.1259469

Schoenecker, T., and Swanson, L. 2002. Indicators of firm technological capability: validity and performance implications. *IEEE Transactions on Engineering Management 49*(1): 36-44. https://doi.org/10.1109/17.985746

Seo, Y. W., and Lee, Y. H. 2019. Effects of internal and external factors on business performance of start-ups in South Korea: The engine of new market dynamics. *International Journal of Engineering Business Management 11*. https://doi.org/10.1177/1847979018824231

Start-up Promotion Agency, 2019, 66-71, Korea National Statistical Approval No. 142016.

Stoel, M. D., and Muhanna, W. A. 2009. IT capabilities and firm performance: A contingency analysis of the role of industry and IT capability type. *Information and Management 46*(3): 181-189. https://doi.org/10.1016/j.im.2008.10.002

Wold, H. 1982. Soft modeling: the basic design and some extensions. *Systems Under Indirect Observation 2:* 343.

Yam, R. C., Guan, J. C., Pun, K. F., and Tang, E. P. 2004. An audit of technological innovation capabilities in Chinese firms: some empirical findings in Beijing, China. *Research Policy 33*(8): 1123-1140. https://doi.org/10.1016/j.respol.2004.05.004

Yoon, J. H. 2018. *A Study on the Influence of Business Performance on Customer Orientation and Technology Capability of SMEs and Venture Business in Electric Power.* Ph.D. dis., Konkuk University.

Zou, S., Fang, E., and Zhao, S. 2003. The effect of export marketing capabilities on export performance: an investigation of Chinese exporters. *Journal of International Marketing 11*(4): 32-55. https://doi.org/10.1509/jimk.11.4.32.20145

SEOK-SOO, KIM is the Director of the Global Entrepreneurs Foundation, Korea. Graduated from Seoul National University, KOREA. Doctoral at Hansung University, Dept. of Knowledge Sevice Consulting, Major in Management Consulting. Career: Professor of Youth-Start-up Entrepreneurs Academy (KOREA), Samsung Fine Chemicals (Rand D, KOREA), Kolon Industries (Technology Commercialization, KOREA), Master Black Belt (6 Sigma; DFSS at SAMSUNG, KOREA). Major research areas: SMEs' Performance, Startups & Entrepreneurs, Technology Commercialization, Digital Transformation of SMEs, Global Entrepreneurship.
ORCID ID: orcid.org/0000-0003-3765-6890

DIMENSIONS AND THEIR ELEMENTS AFFECTING THE INNOVATIVE ACTIVITIES OF AGRICULTURAL SMEs TOWARD THEIR SUSTAINABLE DEVELOPMENT*

Antonín Korauš [1], Katarína Havierniková [2], Miroslav Gombár [3], Filip Černák [4], Felcan Miroslav [5]

[1,5]*Academy of the Police Force in Bratislava, Sklabinská 1, 835 17 Bratislava 35, Slovak Republic*
[2]*Faculty of Social and Economic Relations, Alexander Dubček University of Trenčín, Študentská 3, 911 50 Trenčín, Slovakia*
[3,4]*University of Prešov in Prešov, Faculty of Management, Konštantínova 16, 080 01 Prešov, Slovak Republic*

*E-mails: [1]antonin.koraus@minv.sk ; [2] katarina.haviernikova@tnuni.sk ; [3] miroslav.gombar@unipo.sk ; [4] fcernak@sitno.sk ;
[5]Miroslav.Felcan@minv.sk*

Abstract. The vast majority of firms in each economy are small and medium-sized enterprises (SMEs) including the family business. Their sustainable development depends on the ability to implement the innovative activities. Most research studies dedicated to innovation are focused mainly on technology-based SMEs. Our paper shows the importance of innovative activities in agricultural SMEs. The main aim of this paper is to identify the key elements covered by three main dimensions (technological, non-technological, and organizational) that have an impact on innovative activities of agricultural SMEs toward their sustainable development and to investigate the perception of these elements by agricultural SMEs. The approach of this study is quantitative, based on the data gathered from 192 Slovak agricultural SMEs.

European Research Council
Established by the European Commission

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

The results pointed on the importance of all dimensions and three main elements covered each dimension. The results of this paper may help SMEs, professionals, and policymakers to better understand the importance of innovative activities in agricultural SMEs.

1. Introduction

The significant literature and research studies focused on innovative activities in large and medium enterprises prevail the studies that report on innovative activities in micro and small enterprises (Berne et al. 2019; Raghuvanshi, et al. 2019). This paper widespread the literature sources, which suppose that innovative activities are realized also in the micro, small, medium, as well as family businesses. The innovation is pivotal mainly for entrepreneurs and affects all mechanisms related to SMEs' sustainable existence (products and technology development, the improvement of their designs, the production planning, the adoption of new technologies, marketing, sales, management activities, qualification of employees, etc.) The creation and management of innovation in SMEs is a complex process that uses new knowledge, technologies, and processes for the creation of new, as well as adapting existing products or services. The results of innovation activities bring an increase in efficiency and competitiveness, which contribute to the sustainable development of SMEs.

For the agricultural sector, the low level of innovation is typical, due to the fact, that it has been regarded as a low-tech sector, in which the innovations are accrual and are characterized by a low degree of newness (Ciliberti et al. 2016). If the agricultural SMEs realize the innovation activities, they concern the exploitation of new ideas to produce new products, processes, services, or business practices (Caiazza et al. 2016). Various studies reported that there is a gap between the accepted theories and practices in innovation management in the case of agricultural SMEs. We can find differences in understanding, implementing, and measuring of innovative activities in the SMEs (Faherty & Stephens, 2016). The agricultural SMEs are also facing changes in the national and international context. Their innovative activities are currently seen also as a process that results from various interactions among various actors. Each actor is characterized by its own role. Owner or investor provides sources for the realization of innovative activities and customers create demand. Synchronously, new information and communication technologies can reduce the disadvantages in all aspects of agricultural business. An important factor that can contribute to the increase of the innovation capacities of agricultural SMEs is the targeted policy with its objectives, approaches, and tools.

However, the realized studies showed various analyses without relation to specific aspects together. Authors often concentrated on one aspect without studying the relationships with others. We can find studies focused on innovation activities according to the sized category of SMEs, the innovation capacity of SMEs, their connection in various types of networking, internationalization processes, etc. This research aims to fill this gap by analyzing specific dimensions defined by elements that affect the innovation activity of SMEs toward their sustainable development, based on their specificities: type of SME, size category, and focus of business activities. The results point to the SMEs' perception of selected elements that affect innovative activities in relationships to their specificities.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

The rest of the paper is structured as follows. As first, we defined three main dimensions that affect the innovative activities of agricultural SMEs toward sustainable development. Based on the literature review, we identified the main elements that belong to each dimension. In connection with specificities of agricultural SMEs (type, sized category, and focus of their business activities) we proposed three research hypotheses. The stated above is summarized in part 2. Literature review and Hypotheses Development. Part 3. Data and Methodology described used methodological approach. We described the sampling and we justified the use of statistical tests for the data evaluation. Part 3. Results and Discussion provide main results, which are compared with previous research works. The part Conclusion brings the final assessment, remarks, and main implications.

2. Literature review and Hypotheses Development

Various literature studies provide many dimensions that affected the innovative capability of SMEs. Pierre & Fernandez (2018) observed fourteen dimensions of the innovation capacity of SMEs, from which six they considered highly relevant: network integrations, institutional support, innovation strategy and planning, innovation dedicated resources, access to cash flow and standards, and regulation. Martinez-Roman et al. (2011) identified three dimensions of the innovative capability: knowledge, organizational structure adapted of the development of the innovation and the human factor. Forsman (2011) identified seven dimensions in which manufacturing and service SMEs could achieve the capabilities for innovations: entrepreneurial capabilities, networking capabilities, utilization of knowledge, risk management capabilities, change management capabilities, business development capabilities, and customer and market knowledge. Lumpkin & Dess (2001) evaluated two dimensions: proactiveness and competitive aggressiveness. In this research, we proposed three main dimensions for the next analysis: technological, non-technological, and organizational. Based on the literature review, we identified and sorted selected elements that represent each of the dimensions (Table 1).

Table 1. The dimensions defined by means of elements

Technological dimension	Non-technological dimension	Organizational dimension
T1 Technological processes	NT1 Marketing	O1 Qualification of employees
T2 Financial intensity of innovative activities	NT2 The effectiveness of SMEs' management	O2 The customers' demand
T3 New techniques and equipment used to produce goods or services		

Source: own processing

Technological dimension relates to elements that nowadays spread to all areas of economic life in SMEs and covers: Technological processes (T1), Financial intensity of innovative activities (T2), and New techniques and equipment used to produce goods or services (T3).

The innovation generation process requires a number of factors such as a high level of technological capabilities, strong R&D, and a pool of multidisciplinary skills (Mahemba & Bruijn, 2003). According to Lazikova et al. (2018), the lack of innovativeness belongs to the internal factor that affects the achievement of SMEs' success. The more rapid technological and market changes foster an environment favorable to innovation (DeTienne&Koberg, 2002; Čižo et al. 2020 a). The innovativeness may result in new technological processes. It is possible to increase the innovation ability of SMEs by providing quick and easy access to external sources of knowledge, new information, and communication technologies (ICT). This is connected with using various types of technological processes. Despite this fact, the application of new ICT tools in SMEs is still lagging behind (Corso, et al., 2003).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Technological processes (T1) are often connected mainly with technology-based firms (Rhee et al. 2010). In our research, we try to find out whether agricultural SMEs' perceived them as an important element for their innovativeness.

The ability to ensure the use of advanced technologies based on the most efficient innovation (Okuneviciute Neverauskiene et al., 2020) depends on financial capability and availability. Finance is a crucial determinant for innovation activities in enterprises, SMEs not excluded (Wonglimpiyarat, 2015); and financial constraints hold back innovation (Hyytinen & Toivanen, 2005). Companies can increase the odds of introducing a new service or product successfully if they allocate more money to their innovation activities (Eggert et al., 2014; Cˇižo et al. 2020 b). Many SMEs carrying out their activities in the agricultural sector have little education and limited exposure to financial instruments related to innovative activities, thus the aspects of the financial intensity of innovative activities (T2) belonged to the second element in the Technological dimension.

The third important element of the Technological dimension selected for analysis was (T3) New techniques and equipment used to produce goods or services. This element related mainly to issues of Industry 4.0, which is characterized by a blending of technologies that erase the boundaries between physical, digital, and biological spheres (Koraus at al. 2020). Innovative and latest technology improves productivity to a greater extent. Automation and information technology helps to achieve improvements in material handling, storage, communication system, and quality control (Kumar & Suresh, 2006). The key to all these processes is human capital in terms of making, utilizing and upgrading changes related to Industry 4.0 (Ivanova et al., 2020).

Non- technological dimension consists of two elements that are necessary for the sustainable development of SMEs: Marketing (NT1) and the effective SMEs' management (NT2).

SMEs' innovation activities are the condition for their survival on the market (Benda-Prokeinová et al., 2017; Caurkubule et al. 2020) and they depend on the strategic orientation of SMEs. The quality of the business environment is often regarded as a major factor in the long-term economic competitiveness and sustainable development of SMEs (Grancay et al., 2015). Competitiveness is basically associated with the application of products in the domestic and foreign markets of organizations, integration groups, or countries to successful participation in the exchange of products of material or immaterial nature at different levels of trade (Simo et al., 2016). It might be well accepted nowadays that intensive competitiveness in terms of both quantity and quality makes it extremely difficult for a firm to differentiate itself from its competitors (Mura & Kajzar, 2019). The market in which the SMEs offer their products or services can be a predictor of the effects of innovative activities. In terms of entering international markets, mainly the industrial production companies have the biggest interest in conducting business activities in international markets (Mura, 2019, Mura et al. 2017). SMEs often have to modify their products sold on the international market, not only from the reason that they aim to achieve outstanding business performance and competitive advantage but also to remain in the international market. According to Bozic & Radas (2006), it is possible to expect that the more present an enterprise is in the international market; the more oriented its innovation activities are towards improving product quality, ecological and health aspects, as well as towards complying with legal standards and various regulations. International trade permits everybody to have more access to the goods and services that are created or performed around the world (Kordos, 2019). Due to the intense competition and constant changes, firms have to increase their innovative manners to maintain their competitive edge also through adaptation of marketing activities (NT1). Keskin (2006) in his research pointed also on the fact that developing and then implementing a marketing plan positively impacts firm innovativeness. Market-orientation in SMEs, driven by the feedbacks of customers, is a mechanistic and narrow form of innovation. SMEs are able to improve profitability by aptly matching customer responsiveness and market-driven pricing policy with product

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

innovation. Research on market orientation, to which the use of marketing tools is subordinated, may benefit from reframing existing models to incorporate innovation more directly (Salavou, 2002; Rak, Zrubak 2012; Korshenkov, Ignatyev, 2020).

The prerequisite for the successful application of innovative activities is also an effective management system in SMEs (NT2). Traditional management style based on centralized top-down decisions with many routines hinders problem-solving in innovative ways (Martinez-Roman et al., 2011). Managers (owners) in SMEs are responsible for the success of their business. They have to determine what actions to pursue at a given time. Uncertainty and the continually shifting situations at the market, pressure them to innovate. Managers (owners) in SMEs can make a better decision when there are fewer constraints imposed by an organization's context (DeTienne&Koberg, 2002). Rhee et al. (2010) in their research stated, that top managers of small firms, therefore, are advised to pay full attention to improvements in innovativeness, with a particular emphasis on an ongoing learning practice, in their effort store superior business performance. SMEs have some limitation to the effective management due to their size, and teams that could solve the problems related to innovative activities can hinder the development of innovations. Most of them have a simple structure, which requires direct supervision.

The third dimension is the Organizational dimension. In our research, it narrows relates to the previous dimensions and elements and it concerns to organizational context in SMEs and consists of Qualification of employees (O1), and The customers' demand (O2).

It is characteristic for SMEs, that the small numbers of staff carry out a range of different functions, manage a small budget, and are occupied with survival and only partially solve the innovative activity. Faherty & Stephens (2016) went deeper and dealt with the issues of the possibility to realize the innovative activities by microenterprises. They recommend simplifying the innovation, due to the fact, that the micro-enterprises regard innovation as a complicated activity that is associated with high-level technology research and development. Also, the learning orientation in SMEs has with a positive effect on the innovativeness of SMEs (Keskin, 2006) due to the fact that business advantages and opportunities emanating from the internally stored knowledge (Dvorský et al, 2019) and the human resources are considered as the cornerstone of the development (Jašková, 2019). Anderson and Boocock (2002) note that self-directed, work-based, and informal learning is dominant in small firms, as it allows increased flexibility and adaptability. Due to the stated above, the first important element in this dimension is the (O1) Qualification of employees. Firms meet the demand of their customers, through markets, by supplying products and services (Liao & Rice, 2010).

When SMEs roll out new products and services, the required market knowledge should be obvious to them, as well as the understanding of how to communicate with costumers. Innovation refers to the generation and implementation of new market offerings that previously were unavailable to the firm's customer (Eggert et al., 2014). The quality of the product is established based on the customers' needs. The right quality is determined by the cost of the product and the technical characteristics as suited to the specific requirements (Kumar & Suresh, 2006). Using customer information contributes to the innovation of SMEs (Keskin, 2006). They have key roles in developing product innovations (Forsman, 2011; Zeibote et al. 2019; Korauš et al. 2019). SMEs should use innovation in combination with a market orientation in order to achieve superior performance in terms of profitability (Salavou, 2002). Stated above requires to know, what is the customers' demand (O2).

In the view of the described context of three dimensions and their elements, we propose the following *research hypotheses*. There is a wide range of studies focused on innovation activities in various contexts observed in large

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

and SME enterprises, but there is a low number of studies focused on the family business. The study of this type of enterprise is limited by the data available from these enterprises, due to the fact, that the exact numbers of these enterprises are not stated in official registers. Within the first hypothesis, we compared the perception of the stated dimension by non-family SMEs and family SMEs. *H1: There are statistically significant differences in the perceptions of stated elements related to innovative activities toward sustainable entrepreneurship between the non-family and family SMEs.*

Similarly, the research studies are focused on the individual-sized category of SMEs or their comparison with other categories. This research provides a comparison of SMEs' perception among three main categories of SMEs by means of the second hypothesis. *H2: There are statistically significant differences in the perceptions of stated elements related to innovative activities toward sustainable entrepreneurship among three sized categories of SMEs.*

The last, third hypothesis is focused on SMEs' perception of stated dimensions according to the focus of business activities of their operation: *H3 There are statistically significant differences in perceptions of stated elements related to innovative activities toward sustainable entrepreneurship of SMEs between SMEs that doing business in Slovak market and those in the international market.*

3. Data and Methodology

To fulfill the main aim of the paper, the questionnaire surveys focused on issues of innovative activities of agricultural SMEs were realized. Data collection was carried out in 2019 within the Slovak regions. According to the Statistical Office of the Slovak Republic, there were 119540 SMEs in the Slovak economy in 2019, of which 3555 entities represented the agricultural SMEs. The estimation of range selection for the questionnaire survey from the number of agricultural SMEs was calculated according to formula (1) from Cochran (1977).

$$n = \frac{Z^2 * p * (1-p)}{e^2} \qquad (1)$$

Where: n is the requested sample size, Z - the Z value (e.g. 1.96 for 95% confidence level), p - the estimated proportion of an attribute that is present in the population (for this research the level of p was calculated using the share of agricultural SMEs in the total number of SMEs in the Slovak Republic), d - desired level of precision and $e = 3\%$. We calculated that the requested research sample should be 123 SMEs. For the realization of questionnaires surveys with appropriate reliability and accuracy, the questionnaire surveys were distributed among 200 agricultural SMEs, from which 192 completed the questionnaire correctly.

Whole research sample (structure in Table 2) we sorted according to the *type* of enterprise (non-family SMEs and family SMEs), the *sized category* (according to the definition of OECD we used three categories of SMEs – microenterprises (less than 10 employees), in which the turnover should not exceed EUR 2 million, small enterprises (10-49 employees), where the turnover should not exceed EUR 10 million and medium-sized enterprises (50-249 employees) turnover should not exceed EUR 50 million), the *focus of business activities* (Slovak market or international market). Due to the fact, that there is no official register of the family business in Slovakia, this research has a limitation in research sampling. The selection of respondents that belong to family SMEs was realized on the principle of snowball method (Heckathor, 2011).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

From 192 of SMEs (Table 2), 38 (19.79%) belonged to the family business. The highest number of respondents (54.69%) in the case of size category of SMEs belonged to the category of micro-enterprises, from which 13.02% belonged to family SMEs. In the category of SMEs according to the placement of their conducted business activities, the highest number of SMEs (92.19%) belonged to SMEs, which operate in Slovakia, of which 18.75% belonged to family SMEs.

Table 2. The structure of research sample

Category	Type	Non-family SMEs		Family SMEs		Total	
		N	%	N	%	N	%
Size category	Micro	80	41.67	25	13.02	105	54.69
	Small	61	31.77	11	5.73	72	37.50
	Medium	13	6.77	2	1.04	15	7.81
	Total	**154**	**80.21**	**38**	**19.79**	**192**	**100.00**
Focus of business activities	Slovak	141	73.44	36	18.75	177	92.19
	International	13	6.77	2	1.04	15	7.81
	Total	**154**	**80.21**	**38**	**19.79**	**192**	**100.00**

Source: own research

Respondents were asked to evaluate their perception of individual elements within stated three main dimensions that have an impact on their innovative activities toward sustainable development (Table 1). Stated elements were selected based on their importance toward the innovative activities of SMEs, as it is described in the previous part of this paper (2. Literature review and Hypotheses Development). SMEs' perception of elements that affect their innovative activities toward their sustainable development was realized through the assessment on six points scale from 0 – does not affect the innovation activity, 5 the mostly affect innovative activities.

The evaluation of obtained results was realized by using the descriptive statistics and parametric and non-parametric statistical tests. Using the statistical tests, we verified three hypotheses set out in section 2. Literature Review and Hypotheses Development. For the stated research hypotheses' evaluation, in the first step we utilized the tools of the descriptive statistics (relative frequency, mean, standard deviation, and median) of the respondents' answers. The second step consisted of the calculation of the Shapiro-Wilk test (SW), due to the fact that the using of parametric test (t-test and one way ANNOVA) depends on normally distribution of variables. If the calculated p-value of SW test is higher than confidence level (p=0.05), the normality is not rejected and it is possible to use the parametric test. Otherwise, a non-parametric alternative to the t-test is used Mann Whitney U test (MWU), for the examination of differences between two independent variables, or Kruskal-Wallis test (KW), to compare more than two independent variables (Balboni et al., 2013; Nachar, 2008). The results of the used test (SW, MWU, KW, and ANNOVA) were significant at $p \leq 0.05$ for all groups of SMEs. The results of these tests for each group of SMEs in the division stated above are provided in the next part of this research.

Results and Discussion

Table 3 presents the results of SMEs' perception of stated dimensions described by elements (Table 1) related to their innovative activities toward sustainable development, depending on the type of enterprise (non-family and family SMEs). The results showed that the most of non-family SMEs (27.08%) as well as family SMEs (4.69%) perceived as the most important element for their innovative activities the O1 - Qualification of employees (3.63±1.32 in case of non-family SMEs and 3.62±1.32 in case of family SMEs). The importance of these results corresponds to the research of Talebi & Tajeddin (2001) who argued that SMEs, where the owners/ managers have

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

technical and vocational qualifications, are more likely, across the board, to innovate. Also, Demirbas et al. (2011) in their research confirmed the necessity of qualified personnel. According to them, firms, where the qualified personnel is missing, show a lower propensity to innovate, and thus, the innovation in a smaller manufacturing firm is unlikely to succeed.

In respect to the normality tests' results (the p-value of SW is lower than 0.05 in each case), to investigate for differences in each element between non-family and family SMEs, the MWU test was executed. As can be seen from Table 3, the MWU test confirms that these two groups of SMEs assigned the same importance to all investigated elements. We can accept the hypothesis H1.

Table 3. The perception of elements related to innovative activities by non-family and family SMEs (SMEs' answers, %)

Element	Category	0	1	2	3	4	5	Mean	SD	Median	SW	MWU
T1	Non-family SMEs	3.13	4.69	9.38	23.44	21.35	**18.23**	3.35	1.32	3.00	0.00	0.71
	Family SMEs	1.04	0.52	3.13	5.73	5.73	**3.65**	3.36	1.30	3.00	0.00	
T2	Non-family SMEs	6.77	15.10	20.31	21.88	10.42	**5.73**	2.36	1.34	2.00	0.00	0.77
	Family SMEs	2.60	3.13	4.69	5.21	4.17	**0.00**	2.40	1.34	2.00	0.00	
T3	Non-family SMEs	22.92	9.38	12.50	20.83	6.77	**7.81**	1.94	1.62	2.00	0.00	0.16
	Family SMEs	5.21	5.73	3.13	4.69	0.00	**1.04**	1.89	1.61	1.00	0.00	
NT1	Non-family SMEs	23.44	9.90	9.90	11.98	13.02	**11.98**	2.19	1.81	2.00	0.00	0.73
	Family SMEs	5.73	2.08	2.08	5.73	2.60	**1.56**	2.28	1.83	2.50	0.00	
NT2	Non-family SMEs	5.21	1.04	7.81	22.92	23.96	**19.27**	3.40	1.33	4.00	0.00	0.18
	Family SMEs	0.52	2.60	1.56	5.73	7.29	**2.08**	3.40	1.29	3.00	0.00	
O1	Non-family SMEs	3.13	3.65	6.77	17.71	21.88	**27.08**	3.63	1.32	4.00	0.00	0.30
	Family SMEs	0.00	1.56	1.56	6.77	5.21	**4.69**	3.62	1.32	3.50	0.00	
O2	Non-family SMEs	6.77	5.21	9.38	23.96	17.19	**17.71**	3.14	1.45	3.00	0.00	0.63
	Family SMEs	0.52	2.60	2.08	6.77	5.21	**2.60**	3.19	1.39	3.00	0.01	

Source: own research and calculation in the program Statistica

Within the second hypothesis (H2) we evaluated how the stated elements are perceived by micro, small and medium enterprises. For 18.74% of micro-enterprises as well as 11.46% of small enterprises, the most important element was O1 - Qualification of employees (3.64±1.37 in case of microenterprises and 3.64±1.30 in case of small enterprises). For 2.08% of medium-sized enterprises, the most important element was T1 - Technological processes (3.80±1.15). We can notice that between the qualification of employees and technological processes conducted within SMEs is a close connection. Technological processes are an important part of innovation activities as well as in large enterprises as well as in SMEs. The problem with their implementation in SMEs narrow relates to limited human resources. An increase in system complexity, instead, acts in just the opposite way, as it determines the necessity of technological coordination between SMEs and their customers (Corso et al, 2003). Our results are consistent with the results of Rhee et al. (2010) who pointed on the connection between the learning orientation and proprietary technology in an innovative manner. According to them the learning orientation appears to have the potential to create intangible assets such as technology in an innovative manner.

Due to the results of normality's test ($p \leq 0.05$) presented in the Table, in a way to investigate for differences in SMEs' perception among sized categories (micro, small and medium) in the perceived elements, the non-parametric test KW can be performed. In case if the p-value of normality's test is higher than 0.05, the One-way ANNOVA was performed, because, this statistical technique requires that the variables should be normally distributed. The p-value calculated for both tests showed, that if we compared the SMEs' perception of stated elements from the point

of view of their size category, there are no differences in perception of T1 and O1 among agricultural SMEs. Except for these elements there are no differences in perception of elements NT1 – Marketing, NT2 – The effectiveness of SMEs' management and the O2 – The customers' demand. The p-value of calculated tests was higher than the confidence level of 0.05 (see Table 4). The differences in SMEs' perception we observed in case of elements T2 - Financial intensity of innovative activities (p=0.05) and T3 - New techniques and equipment used to produce goods or services (p=0.01). The T2 was the most important mainly for medium-sized enterprises (3.07±1.39). The empirical evidence obtained within our research corroborates the results in the previous studies. Okuneviciute Neverauskiene et al. (2020) considered the financial situation as a factor of sustainable competitiveness. The financial results of enterprises could spur some of innovation investments (Liao & Rice, 2010). Fundamental source for these activities is internal finance (Serrasqueiro et al., 2011), mainly based on profit (Belas et al., 2018). Fabus et al. (2019) highlighted the efficiency of financial decentralization mechanisms, which improve the innovation capability of firms through government support. Similarly, the T3 was the most important mainly for medium-sized enterprises (2.53±1.51). It is related to the fact that the sustainable development of SMEs depends on the successful implementation of modern techniques, technologies and using the appropriate equipment. Nowadays, the Industry 4.0 comes to the forefront (Kordos, 2019), thus the traditional production process takes on a new dimension. SMEs need to respond to this trend if they want to keep their competitiveness and achieve sustainable development.

Table 4. The perception of elements related to innovative activities according size category of SMEs (SMEs' answers, %)

Element	Category	0	1	2	3	4	5	Total	Mean	SD	Median	SW	KW/ANNOVA
T1	Micro	3.13	3.13	7.29	16.15	10.94	14.06	54.69	3.30	1.43	3.00	0.00	
	Small	1.04	1.56	4.69	11.98	12.50	5.73	37.50	3.35	1.18	3.00	0.00	0.99
	Medium	0.00	0.52	0.52	1.04	3.65	2.08	7.81	3.80	1.15	4.00	0.01	
T2	Micro	6.77	8.85	10.42	16.15	8.85	3.65	54.69	2.41	1.43	3.00	0.00	
	Small	2.60	8.33	12.50	9.38	4.17	0.52	37.50	2.15	1.15	2.00	0.00	**0.05**
	Medium	0.00	1.04	2.08	1.56	1.56	1.56	7.81	3.07	1.39	3.00	**0.14**	
T3	Micro	19.27	9.90	7.29	12.50	1.56	4.17	19.27	1.63	1.58	1.00	0.00	
	Small	7.81	4.17	7.29	10.42	3.65	4.17	37.50	2.28	1.60	2.00	0.00	**0.01**
	Medium	1.04	1.04	1.04	2.60	1.56	0.52	7.81	2.53	1.51	3.00	**0.27**	
NT1	Micro	20.31	4.69	6.77	10.94	5.21	6.77	54.69	1.93	1.81	2.00	0.00	
	Small	8.33	6.25	4.17	6.25	8.33	4.17	37.50	2.33	1.74	2.50	0.00	0.11
	Medium	0.52	1.04	1.04	0.52	2.08	2.60	7.81	3.33	1.72	4.00	0.02	
NT2	Micro	4.69	3.13	5.73	13.02	15.10	13.02	54.69	3.28	1.51	4.00	0.00	
	Small	1.04	0.52	3.13	11.98	14.06	6.77	37.50	3.54	1.10	4.00	0.00	0.51
	Medium	0.00	0.00	0.52	3.65	2.08	1.56	7.81	3.60	0.91	3.00	0.02	
O1	Micro	2.08	2.60	5.73	10.94	14.58	18.75	54.69	3.64	1.37	4	0.00	
	Small	1.04	2.60	1.56	9.90	10.94	11.46	37.50	3.64	1.30	4	0.00	0.88
	Medium	0.00	0.00	1.04	3.65	1.56	1.56	7.81	3.47	0.99	3.00	0.03	
O2	Micro	4.69	5.21	6.25	14.58	11.98	11.98	54.69	3.10	1.54	3.00	0.00	
	Small	2.60	2.08	4.17	13.54	8.85	6.25	37.50	3.14	1.37	3.00	0.00	0.89
	Medium	0.00	0.52	1.04	2.60	1.56	2.08	7.81	3.47	1.25	3.00	**0.12**	

Source: own research and calculation in the program Statistica

In addition this paper indicates how the SMEs in depending on whether they carry out their activities on domestic or international market, perceived stated elements toward dimensions that have impact on their innovative activities toward sustainable development (H3). For 29.17% of SMEs with activities on domestic market, the most important element for the achievement of their innovativeness is the O1 - Qualification of employees (3.62±1.32). The same

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

element was the most important for 2.6% of SMEs which carry out their activities at the international market (3.73±1.33).

As it can be seen from Table 5, this result is supported by the calculated p-value of MWU test and ANNOVA (p-value is higher than significance level 0.05 in each of cases), which confirmed that these two groups of SMEs don't perceive the investigated elements differently. Several studies also confirmed the casual relationships between focus of business activities and innovativeness of SMEs (Lee & Lee, 2007; Mahmoud et al., 2016; O'Cass & Weerawardena, 2009). SMEs which are able to reflect on the pressure from the external as well as internal environment regardless to them conducted activities on domestic or foreign market, they are able to innovate. To achieve innovation, it is therefore essential to maintain adaptive behavior, which requires focus on market needs.

Table 5. The perception of elements related to innovative activities according focus of business activities of SMEs (SMEs' answers, %)

Element	Market focus	0	1	2	3	4	5	Mean	SD	Median	SW	MWU/t-test
T1	Slovak	3.13	5.21	11.98	27.08	24.48	20.31	3.36	1.30	3.00	0.00	0.96
	International	1.04	0.00	0.52	2.08	2.60	1.56	3.27	1.58	4.00	0.02	
T2	Slovak	8.85	17.71	22.92	25.52	12.50	4.69	2.32	1.33	2.00	0.00	0.09
	International	0.52	0.52	2.08	1.56	2.08	1.04	2.93	1.44	3.00	**0.40**	
T3	Slovak	26.04	13.54	13.54	25.00	5.21	8.85	1.96	1.63	2.00	0.00	0.66
	International	2.08	1.56	2.08	0.52	1.56	0.00	1.73	1.49	2.00	0.04	
NT1	Slovak	27.08	11.46	10.94	17.19	14.06	11.46	2.15	1.79	2.00	0.00	0.31
	International	2.08	0.52	1.04	0.52	1.56	2.08	2.67	2.06	3.00	0.02	
NT2	Slovak	5.21	3.13	8.33	27.08	29.17	19.27	3.41	1.32	4.00	0.00	0.84
	International	0.52	0.52	1.04	1.56	2.08	2.08	3.33	1.54	4.00	**0.09**	
O1	Slovak	2.60	5.21	8.33	21.88	25.00	29.17	3.62	1.32	4.00	0.00	0.74
	International	0.52	0.00	0.00	2.60	2.08	2.60	3.73	1.33	4.00	0.00	
O2	Slovak	6.25	7.29	10.94	27.60	21.35	18.75	3.16	1.44	3.00	0.00	0.57
	International	1.04	0.52	0.52	3.13	1.04	1.56	2.93	1.62	3.00	**0.07**	

Source: own research and calculation in the program Statistica

Conclusions

The results of our research showed that innovative activities of SMEs are affected by three stated dimensions: technological, non-technological, and organizational. Within these dimensions, we identified three main highly rated elements that SMEs considered as the most important for the realization of innovative activities in their business toward sustainable development (see also in Figure 1).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
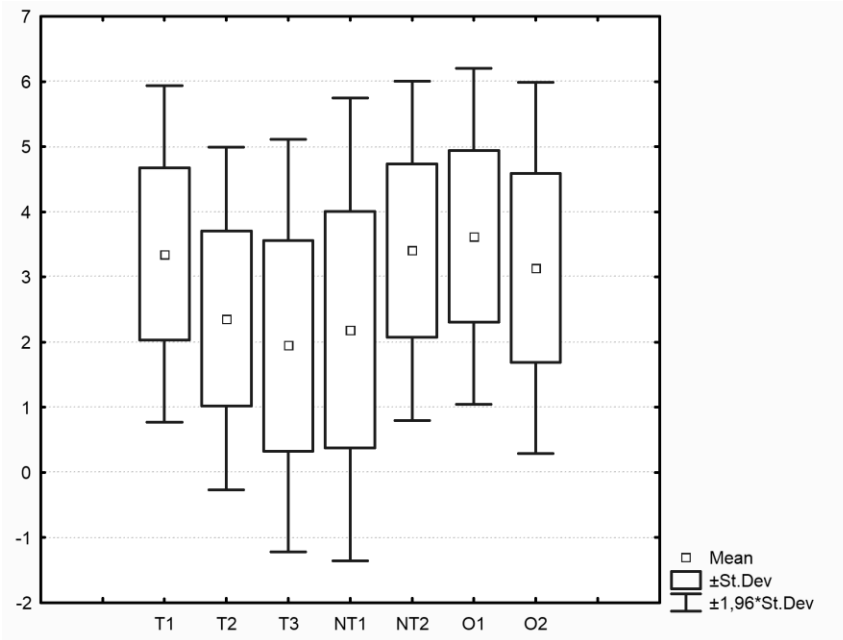

Figure 1. Descriptive statistics of observed elements.

Source: own research

The most important element according SMEs was the (O1) Qualification of employees (3.62±1.32) This result builds on other studies (Keskin, 2006; Mahmoud et al., 2016; Rhee et al., 2010; Talebi & Tajeddin, 2011 and many others) that have confirmed the importance of skills, qualification, learning orientation and training in SMEs towards increasing of their innovation activities. As confirmed by Polakovic et al. (2015) the education for managers and owners of SMEs is important due to the fact, that they usually get education in order to get soft and hard skills, which are necessary for achieving the required performance of the organization.

Second important element according to the SMEs' perception was (NT2) The effectiveness of SMEs' management (3.40±1.33). Saunila (2014) stated that human factors include the people and social practices as ingredients in organizational success, on which the innovative activities depend. In regard to achieving the innovative activities at the required level, it is necessary to have person/s in firm, responsible for finding the firms' innovative capabilities. Due to the fact, that innovation activity involves the whole organization and conditions of the organizational behavior.

Third, the highly rated element was (T1) Technological processes (3.35±1.32) and and cyber-security strategies. They consist of the ordered sequence of steps that must be followed in order to achieve the innovations. Technology is one of the enablers of innovation (Mambula, 2002). The Industry 4.0 approach permitted the creation of such an environment in which all elements are continuously and effortlessly linked together. The platform of Industry 4.0 could provide also for agricultural SMEs the innovative background. On the opposite side, SMEs' innovative activities are affected by obstacles in the innovativeness processes due to the fast development of technologies (Zambon et al., 2019), financing these activities, etc. Some of the research studies showed the tendency of SMEs

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

to adopt soft technologies as the operating methods, improvements in production processes, methods, organization and the market (Mahemba & Bruijn, 2003; Mambula, 2002)

The understanding of innovation in SMEs has an important economic implication. The innovative activities of SMEs are affected by various elements. This paper provides the results of SMEs' perception of those elements that were in the previous research studies identified as fundamental for SMEs' future development toward sustainability.

As the COVID-19 pandemic continues to create long-term demands for remote work and more online activity, SMEs' must be vigilant in not only maintaining their cyber-security strategies but also in being proactive to prevent cyber attacks and address any possible vulnerabilities before they pose a problem. One of the most important lessons we all are learning during this pandemic is that we are stronger and more successful when we work together, and that is clear in the steps we must take to protect our businesses and to educate the public in proper cyber security.

References

Anderson, V., & Boocock, G. (2002). Small firms and internationalisation: learning to manage and managing to learn. Human Resource Management Journal, 12(3), 5-24. https://doi.org/10.1111/j.1748-8583.2002.tb00068.x

Balboni, B., Bortoluzzi, G., & Grandinetti, R. (2013). On the relationship between size, capabilities and internationalisation: an explorative analysis of Italian subcontracting SMEs. International Journal of Globalisation and Small Business, 5(1-2), 114-132. https://doi.org/10.1504/IJGSB.2013.050489

Berne, DF., Coda, R. & Krakauer, P. (2019). The innovation challenge in micro and small enterprises (MSE). Innovation & Management Review. 16 (3), 235-252. https://doi.org/10.1108/INMR-03-2019-0031

Benda-Prokeinová, R., Dobeš, K., Mura, L., Buleca, J. 2017. Engel's Approach as a tool for estimating consumer behaviour. E & M Ekonomie a Management, 20 (2), 15 - 29 doi: 10.15240/tul/001/2017-2-002

Bozic, L., & Radas, S. (2006). The effects of Innovation activities in SMEs in the Republic of Croatia. Croatian economic survey, Issue 8., 33-52. Retrieved April 2020, from https://hrcak.srce.hr/index.php?show=clanak&id_clanak_jezik=9600

Caiazza, R., Volpe, T., & Stanton, JL. (2016). "Guest editorial", Innovation in the agro-food value chain. British Food Journal, 118 (6), 1282-1291. https://doi.org/10.1108/BFJ-03-2016-0129

Ciliberti, S., Carraresi, L., & Bröring, S. (2016). Drivers of innovation in Italy: food versus pharmaceutical industry. British Food Journal, 118(6), 1292-1316. https://doi.org/10.1108/BFJ-10-2015-0405

Čižo, E., Lavrinenko, O., Ignatjeva, S. 2020 a. Analysis of the relationship between financial development and economic growth in the EU countries. Insights into Regional Development, 2(3), 645-660. https://doi.org/10.9770/IRD.2020.2.3(3)

Čizo, E., Ignatjeva, S., Lavrinenko, O. 2020 b. Determinants of financial development of the EU countries in the period 1995-2017. Insights into Regional Development, 2(2), 505-522. https://doi.org/10.9770/IRD.2020.2.2(1)

Cochran WG. (1977). Sampling Techniques. New York: Wiley and Sons.

Corso, M., Martini, A., Paolucci, E., & Pellegrini, L. (2003). Knowledge management configurations in Italian small to medium enterprises. Integrated Manufacturing Systems, 14(1), 45-56. https://doi.org/10.1108/09576060310453344

Caurkubule, Zh. L., Kenzhin, Zh. B. Bekniyazova, D.S., Bayandina, G.D., Dyussembekova, G. S. 2020. Assessment of competitiveness of regions of the Republic of Kazakhstan. Insights into Regional Development, 2(1), 469-479. http://doi.org/10.9770/IRD.2020.2.1(6)

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Demirbas, D., Hussain, J. G., & Matlay, H. (2011). Owner-managers' perceptions of barriers to innovation: empirical evidence from Turkish SMEs. Journal of Small Business and Enterprise Development, 18 (4), 764-780. https://doi.org/10.1108/14626001111179794

DeTienne, D. R., & Koberg, C. S. (2002). The impact of environmental and organizational factors on discontinuous innovation within high-technology industries. IEEE Transactions on engineering management. 49(4), 352-364. https://doi.org/10.1109/TEM.2002.806719

Dvorský, J., Petráková, Z., Polách, J. (2019). Assessing the Market, Financial, and Economic Risk Sources by Czech and Slovak SMEs. International Journal of Entrepreneurial Knowledge, 7(2), 30-40. doi:10.12345-0008

Eggert, A., Thiesbrummel, C., & Deutscher, C. (2014). Differential effects of product and service innovations on the financial performance of industrial firms. Journal of Business Market Management, 7(3), 380-405. Retrieved April, 15, 2020 from http://www.jbm-online.net/index.php/jbm/article/view/80

Fabus, M., Dubrovina, N., Guryanova, L., Chernova, N. & Zyma, O. (2019). Strengthening financial decentralization: driver or risk factor for sustainable socio-economic development of territories. Entrepreneurship and Sustainability Issues, 7(2), 875-890. http://doi.org/10.9770/jesi.2019.7.2(6)

Faherty, U., & Stephens, S. (2016). Innovation in micro enterprises: reality or fiction? Journal of small business and enterprise development, 23 (2), 349-362. https://doi.org/10.1108/JSBED-11-2013-0176

Forsman, H. (2011). Innovation capacity and innovation development in small enterprises. A comparison between the manufacturing and service sectors. Research policy, 40(5), 739-750.

Grancay, M., Grancay, N., Drutarovska, J., Mura, L. 2015. Gravity model of trade of the Czech and Slovak Republics 1995-2012: How have determinants of trade changed. Politicka Ekonomie, 63 (6), 759-777.

Heckathorn, DD. (2011). Comment: Snowball versus respondent-driven sampling. Sociological methodology, 41(1), 355-366. https://doi.org/10.1111/j.1467-9531.2011.01244.x

Hyytinen, A., & Toivanen, O. (2005). Do financial constraints hold back innovation and growth?: Evidence on the role of public policy. Research Policy, 34(9), 1385-1403. https://doi.org/10.1016/j.respol.2005.06.004

Ivanova, E., Masarova, J., Koisova, E. (2020). Evaluation of the level of development of digital economy and digital skills in Slovak Republic and Czech Republic. In Kordos, M. (Ed.) Interntational Scientific Conference on the Impact of Industry 4.0 on Job Creation, pp. 167-175. Trenčianske Teplice: Alexander Dubček University of Trenčín (Slovakia).

Jašková, D. (2019). Assessment of social development in Slovakia in the context of human resources. Central European Journal of Labour Law and Personnel Management, 2 (2), 21-32. ISSN 2644-4917. https://doi.org/10.33382/cejllpm.2019.03.02

Keskin, H. (2006). Market orientation, learning orientation, and innovation capabilities in SMEs An extended model. European Journal of Innovation Management, 9(4), 396-417. https://doi.org/10.1108/14601060610707849

Kordos, M. (2019). The synergies of USA foreign trade policy agenda challenges within the Industry 4.0. AD ALTA – Journal of interdisciplinary research, 9(1), 137-142

Korauš, A., Gombár, M., Kelemen, P. & Backa, S. (2019). Awareness of security risks associated with payment systems analyzed by the methods of multidimensional statistics. Journal of Security and Sustainability Issues, 8(4), 687-703. https://doi.org/10.9770/jssi.2019.8.4(12)

Korauš, A., Kaščáková, Z., Felcan, M. (2020). The impact of ability-enhancing HRM practices on perceived individual performance in IT industry in Slovakia. Central European Journal of Labour Law and Personnel Management, 3(1), 33-45. doi: 10.33382/cejllpm.2020.04.03

Korshenkov, E., Ignatyev, S. 2020. Empirical interpretation and measurement of the productivity and efficiency of regions: The case of Latvia. Insights into Regional Development, 2(2), 549-561. https://doi.org/10.9770/IRD.2020.2.2(4)

Kumar, S. A., & Suresh, N. (2006). Production and operations management. New Delhi: New Age International (P) Limited, Publishers.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Lazikova, J., Bandlerova, A., Rohacikova, O., Schwarcz, P., Rumanovska, L. (2018). Regional Disparities of Small and Medium Enterprises in Slovakia. Acta Polytechnica Hungarica, 15(8), 227-246. https://doi.org/10.12700/APH.15.8.2018.8.12

Liao, T. S., & Rice, J. (2010). Innovation investments, market engagement and financial performance: A study among Australian manufacturing SMEs. Research Policy, 39(1), 117-125. https://doi.org/10.1016/j.respol.2009.11.002

Lee, C. & Lee, CG. (2007). SME innovation in the Malaysian manufacturing sector. Economics Bulletin, 12 (30), 1-12. Retrieved April, 10, 2020 from https://ro.uow.edu.au/cgi/viewcontent.cgi?referer=https://scholar.google.sk/&httpsredir=1&article=4159&context= commpapers

Lumpkin, G. T., & Dess, G. G. (2001). Linking two dimensions of entrepreneurial orientation to firm performance: The moderating role of environment and industry life cycle. Journal of Business Venturing, 16(5), 429-451. https://doi.org/10.1016/S0883-9026(00)00048-3

Mahemba, C. M., & Bruijn, E. J. D. (2003). Innovation activities by small and medium sized manufacturing enterprises in Tanzania. Creativity and innovation management, 12(3), 162-173. https://doi.org/10.1111/1467-8691.00279

Mahmoud, M. A., Blankson, C., Owusu-Frimpong, N., Nwankwo, S., & Trang, T. P. (2016). Market orientation, learning orientation and business performance. International Journal of Bank Marketing, 34(5), 623-648. https://doi.org/10.1108/IJBM-04-2015-0057.

Mambula, C. (2002). Perceptions of SME growth constraints in Nigeria. Journal of Small Business Management, 40(1), 58–65. https://doi.org/10.1111/1540-627X.00039

Martinez-Roman, J. A., Gamero, J., & Tamayo, J. A. (2011). Analysis of innovation in SMEs using an innovative capability-based non-linear model: A study in the province of Seville (Spain). Technovation, 31(9), 459-475. https://doi.org/ 10.1016/j.technovation.2011.05.005

Mura, L. (2019). Entrepreneurship internationalization – Case of Slovak family businesses. AD ALTA-Journal of Interdisciplinary Research, 9(1), 222-226.

Mura, L., Havierniková, K, Machová, R. 2017. Empirical results of entrepreneurs' network: Case study of Slovakia. Serbian Journal of Management, 12(1), 121-131

Mura, L., Kajzar, P. (2019). Small Businesses in Cultural Tourism in a Central European Country. Journal of Tourism and Services, 10(19), 40-54. https://doi.org/10.29036/jots.v10i19.110

Nachar, N. (2008). The Mann-Whitney U: A test for assessing whether two independent samples come from the same distribution. Tutorials in quantitative Methods for Psychology, 4(1), 13-20. https://doi.org/10.20982/tqmp.04.1.p013

O'Cass, A., & Weerawardena, J. (2009). Examining the role of international entrepreneurship, innovation and international market performance in SME internationalisation. European Journal of Marketing, 43 (11-12), 1325-1348. https://doi.org/10.1108/0309056 0910989911

Okuneviciute Neverauskiene, L., Danileviciene, I., & Tvaronaviciene, M. (2020). Assessment of the factors influencing competitiveness fostering the country's sustainability. Economic Research-Ekonomska Istraživanja, 33(1), 1909-1924.

Pierre, A., & Fernandez, A-S. (2018). Going deeper into SMEs' innovation capacity: and empirical exploration of innovation capacity factors. Journal of Innovation Economics & Management, Issue 25, pp. 139-181. https://doi.org/10.3917/jie.pr1.0019

Polakovic, P., Fabus, M., Gasperova, J., & Slovakova, I. (2015). The effective use of information technologies in education and management of current managers. In Bittmanova, B. and Vlkova, E. (Eds.), International Relations 2015: Current Issues of world economy and politics, Proceedings paper (pp. 585- 594). Smolenice (Slovakia): University of Economics in Bratislava.

Raghuvanshi, J., Agrawal, R., & Ghosh, PK.. (2019). Measuring the innovation capability of micro enterprises in India. Benchmarking: An International Journal, 26(5), 1405-1430. https://doi.org/10.1108/BIJ-08-2018-0229

Rak, R,, Zrubak, R. (2012). Project eCALL – Car in Emergency Situation. 7th Scientific International Conference Crisis Management: Envirenmental Protection of Population – Conference Proceedings. Edited by Horak, R; Juricek, L., Schwarz, R. pp. 251-258, Proceedings paper, ISBN 978-80-86710-57-0.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Rhee, J., Park, T.; Lee, D. H. (2010). Drivers of innovativeness and performance for innovative SMEs in South Korea: Mediation of learning orientation. Technovation, 30(1), 65-75. https://doi.org/10.1016/j.technovation.2009.04.008

Salavou, H. (2002). Profitability in market-oriented SMEs: does product innovation matter? European Journal of Innovation Management, 5(3), 164-171. https://doi.org/10.1108/14601060210436736

Saunila, M. (2014). Innovation capability for SME success: perspectives of financial and operational performance. Journal of Advances in Management Research, 11(2), 163-175. https://doi.org/10.1108/JAMR-11-2013-0063

Serrasqueiro, Z., Maçãs Nunes, P., & Leitão, J. (2011). Sources of finance for R&D investment: Empirical evidence from Portuguese SMEs using dynamic estimators. Innovation – Organization and Management, 13(2), 187-206. https://doi.org/10.5172/impp.2011.13.2.187

Simo, D., Mura, L., Buleca, J. (2016). Assessment of milk production competitiveness of the Slovak Republic within the EU-27 countries. Agricultural Economics-Zemedelska Ekonomika, 62(10), 482-492. https://doi.org/10.17221/270/2015-AGRICECON

Talebi, K., & Tajeddin, M. (2011). The adoption of new and innovative knowledge by small and medium enterprises of Iran: Opportunities and constraints for growth. African Journal of Business Management, 5(1), 39-49. https://doi.org/10.5897/AJBM10.366

Wonglimpiyarat, J. (2015). Challenges of SMEs innovation and entrepreneurial financing. World Journal of Entrepreneurship, Management and Sustainable Development, 11(4), 295-311. https://doi.org/10.1108/WJEMSD-04-2015-0019

Zambon, I., Cecchini, M., Egidi, G., Saporito, MG., & Colatoni, A. (2019). Revolution 4.0: Industry vs. Agriculture in a Future Development for SMEs. Processes, 7(1), article number 36. https://doi.org/10.3390/pr7010036

Zeibote, Z., Volkova, T., Todorov, K. 2019. The impact of globalization on regional development and competitiveness: cases of selected regions, Insights into Regional Development, 1(1), 33-47. https://doi.org/10.9770/ird.2019.1.1(3)

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Prof. Ing. **Antonín KORAUŠ**, PhD., LL.M., MBA is professor at Academy of the Police Force in Bratislava, Slovak Republic. Research interests: economy security, finance security, cyber security, energy security, finance, banking, management, AML, economic frauds, financial frauds, marketing, sustainability.
ORCID ID: https://orcid.org/0000-0003-2384-9106

Katarína HAVIERNIKOVÁ, PhD., is an Assistant Professor at the Faculty of Social and Economic Relations, Alexander Dubček Univesity in Trenčín, Slovakia. Her research interest is focused on issues of small and medium - sized enterprises, entrepreneurial intention, industrial clusters, risk management and regional development. During her pedagogical and research activities she has been involved in work on scientific research projects of faculty and departmental character as an effective project leader, deputy head of the project, co-worker. She publishes a series of publications, both in domestic and international periodicals, journals and scientific monograhps.
ORCID ID: https://orcid.org/0000-0002-9019-8684

Assoc. Prof. Ing. **Miroslav GOMBÁR**, PhD. is an associate professor in the Department of Management, Faculty of Management at the University of Prešov in Prešov since 2016. Since 2016, he works as head of the Department of Management, and teaches school subjects: statistics, management, operations management, and logistics.
ORCID ID: https://orcid.org/0000-0002-8383-7820

Filip ČERNÁK, Ph. D. Candidate at the Faculty of Management at the University of Prešov in Prešov, Slovak Republic
ORCID ID: https://orcid.org/0000-0001-7812-9371

Miroslav FELCAN is an associate professor at Academy of the Police Force in Bratislava, Slovak Republic. Research interests: administrative law, tax law, financial law, finance security, economic frauds, financial frauds, sustainability.
ORCID ID: https://orcid.org/0000-0002-4274-4417

_____

Publisher
http://jssidoi.org/esc/home

THE IMPACT OF PUBLIC-PRIVATE PARTNERSHIP ON LABOR MOBILITY AND EMPLOYMENT PROMOTION

Raikhan Nuranova [1], Maira Ryskulova [2], Kulyash Aidarkhanova [3], Nurgul Baigelova [4]

[1,2,4] Narxoz University, Almaty, Kazakhstan
[3] Al-Farabi Kazakh National University, Almaty, Kazakhstan

*E-mails:[1]raikhan.nuranova@narxoz.kz; [2] maira.ryskulova@narxoz.kz; [3] aidarkhanova_k@mail.ru;
[4] nurgul.baigelova@narxoz.kz*

Abstract. In conditions of a budget deficit, an urgent task facing the state is the development of new instruments that allow replacing budget investments in the creation and modernization of infrastructure with private investments and at the same time optimizing financial costs for these purposes. The priority direction of the investment policy of the regions and the country as a whole is the implementation of socially significant projects using public-private partnership mechanisms, the task of which is to maximize the potential of business for the implementation of the tasks for which the state bears responsibility. The purpose of the study of this article is to analyze the indicators of public-private partnerships in relation to the development of labor mobility, which make it possible to judge the effectiveness of the state policy in the field of employment regulation. The current situation in the labor market is always in the focus of attention of the state, business and society as a whole, affecting both on the economic development of the country, social policy, competitiveness of enterprises, and on the well-being of the individual.

Keywords: public-private partnership (PPP); economically active population (EAP); labor market; labor mobility; workforce; qualified workforce

1. Introduction

Public-private partnership is a contractual relationship between government agencies and private business, which implies mutually beneficial coordinated cooperation between the parties in the implementation of projects of social and state importance, and financial risks, costs and results are distributed in proportions, in accordance with the provisions of a legally binding agreement.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Public-private partnership has established itself as a successful tool for interaction between business and the state. A lot of work is being done in Kazakhstan for the qualitative growth and development of the PPP mechanism. The most active partnership between the state and business is developing in the field of education.

The current stage of development of education in the world is characterized by a special intensity of transformations, equally affecting the organizational and managerial structures of education, its targets and content, methods and technologies of teaching, sources and mechanisms of financing, as well as the conditions and forms of educational, scientific and industrial cooperation.

In modern conditions, the main priority of the state, first of all, in order to maintain and develop the viability and well-being of the people, should be the development of socio-economic processes, the effective performance of the social function. Public-private partnership is not only economic, but also a very important social significance, plays a decisive role in ensuring a particular standard of living of the country's population, in the formation and development of professional opportunities (Isakhova, 2015).

The goal of developing public-private partnership is:
- firstly, the interaction between the state and business;
- secondly, attracting private investment;
- third, stable economic development;
- fourthly, increasing the competitiveness of the national economy;
- fifth, the formation of a single capital market for goods and services, labor resources.

The process of public-private partnership in general is a specific form of relations between the state and private entrepreneurship, used to solve specific problems, which is currently in an active form of demand. In this regard, from a theoretical and practical point of view, it is of particular interest to analyze the formation and development trends of public-private partnership.

Despite the experience of implementing concession projects, one of the main problems hindering the development of PPP in Kazakhstan is the lack of qualified personnel. In addition, the legislation of the republic does not allow to fully implement the concession models used throughout the world. This makes it difficult to attract investment in the social sphere, housing and communal services and other sectors of the economy.

2. Literature review

In many developed and developing countries, public-private partnership is one of the main organizational and economic mechanisms for enhancing innovative activity and attracting long-term investments. PPP as a tool for enhancing and developing innovative activity is widely used by developed countries and has proven its effectiveness in practice.

The literature presents a wide range of studies in the field of PPP and its role in the development of an innovative economy:
- concept and theory by Ablaev I.M., Akhmetshina E.R. (2016),
- methodology by Javed A.A., Lam P.T., Chan A.P. (2014),
- models of interaction between government and business structures in the framework of PPP by Cruz C. O., Marques R.C. (2014),
- approaches to assessing its effectiveness by Berezin A., Sergi B.S., Gorodnova N. (2018).

Authors as Cong X., Ma L. (2018) had considered comparative analysis of international experience in implementing PPP projects. Nevertheless such questions had been considered in the scientific works of Akintoye A., Beck M., Kumaraswamy M. (2016), Roumboutsos A. (2015), Ullah F., Ayub B., Siddiqui S.Q., Thaheem M.J. (2016).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

As international experience shows, studies of Shmelev S. E., Sagiyeva R. K., Kadyrkhanova Z. M., Chzhan Y. Y., Shmeleva I. S. (2018), the implementation of PPP projects is also a way to improve the efficiency of public sector management.

Public-private partnership in the innovation sector allows solving a number of problems of PPP development and has the following advantages:
- provides a great return on research funding, and business entities are interested in the successful solution of issues of further commercialization of their results;
- helps to attract the experience of the private sector and create a competitive environment for open and transparent tenders in the implementation of innovative projects;
- distributes responsibility between partners: the state sets the goals of the project in terms of public interests, determines the cost and quality of parameters, monitors the implementation of projects, and the private partner takes over operational activities at different stages of the project - development, financing, construction and operation, management, practical implementation of services and products.

The study of the aspects of public-private partnership allows us to analyze the mobility of labor resources, since without a mobile labor market, our country is unlikely to be able to quickly solve the issues of modernization and ensuring the innovative orientation of its economy, which would allow it to take its rightful place, in particular, to enter the top twenty competitive countries of the world.

The transfer of new technologies, production and management experience, the replenishment of knowledge and skills, as well as other positive changes in social reproduction are associated with the mobility of the population.
The solution of the entire range of economic and social problems of the development of public-private partnerships requires consistent and steady development and increased efficiency of interaction between the state and business. Thus, E.B. Domolatov, I.N. Dubina, A.N. Turginbayeva (2018) consider in their publications the importance of public-private partnership (PPP) for sustainable growth and increasing the competitiveness of the national economy, and also determine the constraining factors for the development of cooperation in the field of public-private partnership and the use of its mechanisms in the development of innovative investment processes in the economy of Kazakhstan.

On the one hand, the complication of socio-economic life makes it difficult for the state to perform socially significant functions. On the other hand, business is interested in new investment objects (Efimov, 2017). An important role in the implementation of this task is assigned to the economic analysis of the activities of business entities, with the help of which the strategy and tactics of enterprise development are developed, plans and management decisions are justified, their implementation is monitored, reserves for increasing production efficiency are identified, the results of the enterprise, its divisions, employees are evaluated ... Labor resources are the first productive force of social production, and labor productivity is the determining criterion for the socio-economic development of society as a whole.

The public sector of the economy is important in the life of society. This is due to the fact that the scope of providing important social services, such as health care, social protection and education, largely determines the level of human capital development. As you know, human capital largely determines the potential of the economy and creates important conditions for its development. Thus, the public sector of the economy largely determines the development prospects of the state. In this regard, the use of effective and proven organizational technologies that can significantly improve the quality of services provided in the public sector of the economy is vital.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

In world practice, public-private partnership has established itself as an effective mechanism for optimizing budget expenditures, which allows you to successfully solve important problems of a public nature by attracting private financial and intellectual (human) capital (Shlafman, 2013).

Improving the use of human potential is the main source of social and economic growth. Hence, the importance of collective study and analysis of the main factors that determine both the formation of the composition of labor resources, their professional structure and qualifications, the level of general and special training, and ways to increase labor efficiency. The solution to these problems is possible on the basis of mutually beneficial cooperation in the form of public-private partnership.

Bogdashkina I.V., Kuspanova A.E. (2018) examining the problems of employment, they describe in their publications that effective employment of the working-age population cannot be ensured without purposeful efforts by the state for redistribution, training and social support and protection of citizens. However, these efforts must be consistent with the freedom of activity of the subjects of market relations, meet the requirements of the labor market. Meanwhile Dmitriev Yu. (2015) believes that employers, who are extremely dissatisfied with the state "efforts" in the field of personnel training, also do not show high activity in the area of personnel training.

Analyzing the strategies for improving the quality of the labor force Menshikova M.A., Abbas A.B. (2017) argue that the new economic conditions require serious changes in the structure and characteristics of the labor force by creating a strategy to improve its quality.

According to M. Simonova (2018), improving the quality of the workforce is a systemic task, in the solution of which various states, economic, social, legal, and economic structures should be involved, and their constructive interaction should ensure the required level of quality. The need of post-industrial production for workers who are able not only to meet the requirements, but also to initiate subsequent development, should create conditions for the formation of just such qualities of the human personality.

In the future, the consolidation of the resources of business, the state and the education sector in the development of the system of not only secondary vocational education, but also higher vocational education is possible on the basis of mutually beneficial cooperation in the form of public-private partnership (hereinafter - PPP). In conditions of tight budgets, both regional and republican, public-private partnership is becoming a tool that allows you to implement various projects with minimal state participation.

Studying the foreign experience of public-private partnership, Shadrintseva A.N. (2015) notes that in the world practice there are two types of cluster creation:
1 The first approach provides that at the state level sectoral and regional priorities and the clusters that are planned to be developed are selected (in countries with stronger state regulation of the economy (France, Korea, Singapore, Sweden, Finland, Slovenia, etc.). public authorities purposefully create infrastructure for priority clusters, as well as determine the amount of funding, while funding for these activities can also be supported from the federal budget, including through the implementation of measures of state support for small and medium-sized businesses.
2 In the second approach (used in countries pursuing liberal economic policies (USA, UK, Australia, Canada, etc.), the initiative to create clusters comes from the economic entities themselves operating in market conditions, and government bodies are extremely rarely involved in creating infrastructure and financing the creation of clusters, however, they create a system of incentives for the interest of regional authorities, which are responsible for the effectiveness of the functioning of the created cluster (Shadrintseva, 2015).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

The effective use of labor potential is one of the most important tasks of the formation of a socially oriented state, carried out within the framework of state policy in Kazakhstan.

The labor market as a multifaceted, heterogeneous, dynamic system of socio-economic relations is designed to ensure the constant reproduction and efficient use of labor. With the development of scientific, technical, technological and informational progress, the role of the labor market increases. Therefore, the creation of a balanced labor market in order to replenish the growing sectors of the economy with highly qualified personnel becomes necessary in modern conditions, especially in the interaction of the state and business.

The effective use of labor potential is one of the most important tasks of the formation of a socially oriented state, carried out within the framework of state policy in Kazakhstan, in this connection, the labor market as a multifaceted, heterogeneous, dynamic system of socio-economic relations is designed to ensure constant reproduction and effective use of labor.

With the development of scientific, technical, technological and informational progress, the role of the labor market increases. Therefore, the creation of a balanced labor market in order to replenish the growing sectors of the economy with highly qualified personnel becomes necessary in modern conditions, especially in the interaction of the state and business.

In her scientific publications, Chagina E.A. (2017) considers the labor market as an economic system, where it is necessary to take into account that the socio-infrastructural characteristics of a particular territory determine the degree of closeness of local labor markets. The level and quality of development of the social sphere and engineering infrastructure of the region and territory plays a key role for the development of labor mobility as the most important qualitative indicator of its market value, confirming the integrity of the basic elements of the labor market - labor prices, supply and demand.

In the system of economic relations, labor resources occupy an important place, since labor resources are one of the indicators, the state of which makes it possible to judge national well-being, stability and efficiency of socio-economic transformations. Some authors, such as P.E. Schlender, Yu.P. Kokin (2019), believe that labor resources are a category that occupies an intermediate position between the economic categories "labor potential" and "total labor force". They note that labor resources are the able-bodied part of the population, which, having physical or intellectual capabilities, is able to produce material goods and provide services.

For example, V.B. Bychin, V.N. Bobkov (2017) argues that "labor resources are part of the country's population capable of participating in the national economy at a given level of development of productive forces and within the framework of these production relations".

According to I.I. Eliseeva (2018), "labor resources are a part of the population with the necessary physical and intellectual abilities and knowledge to work in any area". From this definition, it means that labor resources include both real workers who are already employed in the country's economy and potential workers who are not employed but can work.

Volgin Yu., Odegova Yu.G. (2018) believe that "labor resources represent the working-age population of working age, as well as the resulting set of socio-economic relations at all phases of social production".

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

A.L. Mazin (2017) notes that "labor resources are a collection of people with the ability to work, along with many others. When analyzing them, the task is set to investigate a certain category of the population with all its inherent abilities and needs, and above all for work".

3. Research questions

Ensuring the rational use of labor resources in all regions of the country is one of the most important tasks of the socio-economic development of the economic complex of Kazakhstan. To solve it, an objective assessment of the labor resources that society has, the needs of the economic complex in the labor force and the ways of the most efficient and complete use of labor resources in the country and regions, based on the interests of the whole society on the basis of public-private partnership are required (Figure 1).
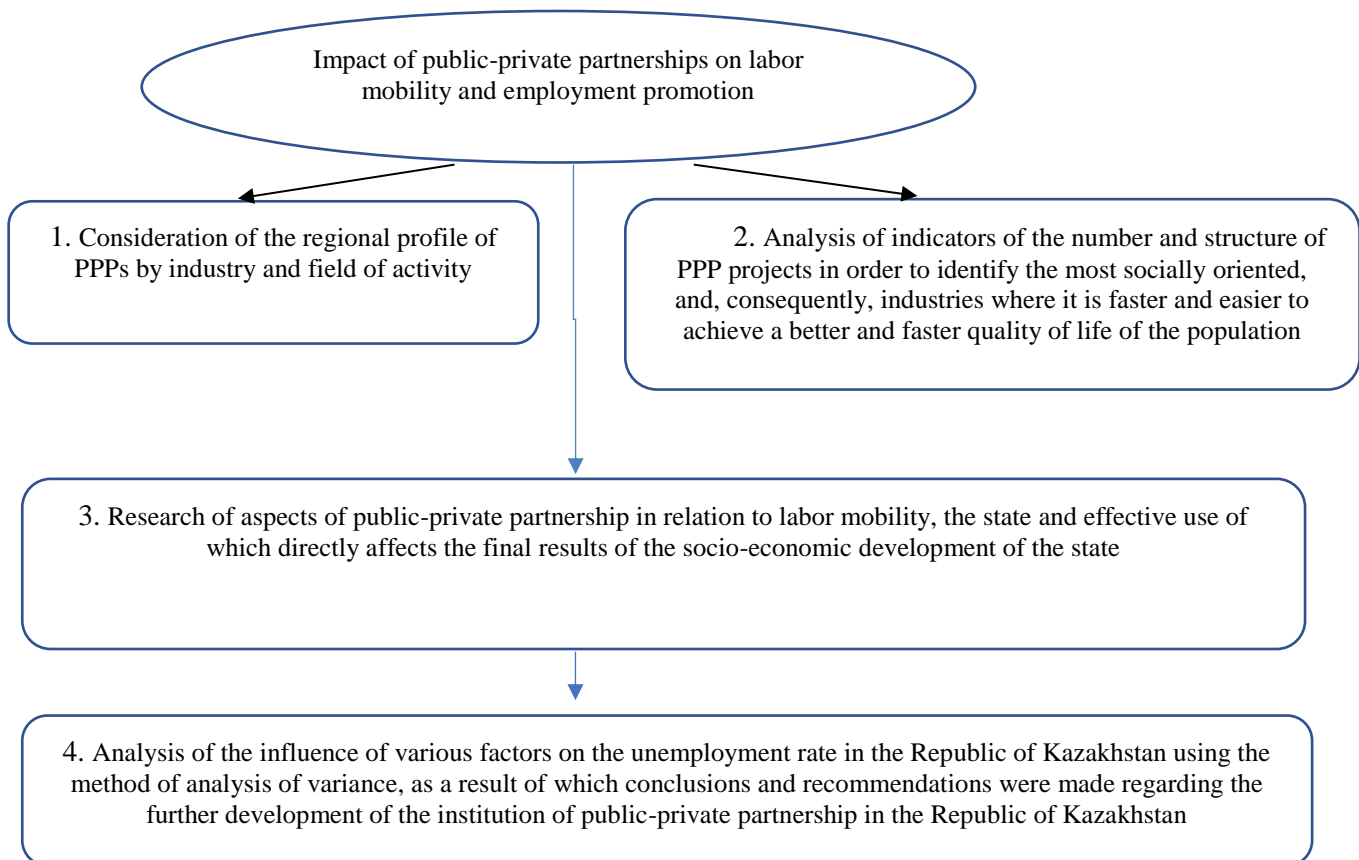
Figure 1. Research questions
Source: compiled by authors

The implementation of socially significant projects using public-private partnership mechanisms is to maximize the potential of business and the participation of competent government policy. Optimal provision of the economy as a whole and individual enterprises with employees of the relevant specialties with sufficient qualifications is necessary for the successful functioning and development of enterprises on the basis of public-private partnerships.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

All over the world, PPP schemes are very often used in connection with the construction of healthcare facilities, education, in the field of transport and road transport infrastructure, during the reconstruction and construction of sports facilities. The popularity of PPPs in these areas is explained by a number of advantages for infrastructure projects as a whole: minimization of the project budget, the best price-quality ratio attractive to private investors, the use of the best management and construction technologies, and reduction of commercial risks due to the participation of the state in the project.

4. Materials and methods

The majority of projects on the territory of Kazakhstan are in the spheres of education and healthcare. In the field of education, this is the implementation of projects for such objects as kindergartens, schools, dormitories for students and teachers, etc., in the health sector - hospitals, clinics, medical laboratories, feldsher-obstetric centers, etc. Regional profile PPPs by industries and spheres of activity at the end of 2019 are presented in Table 1, where the numerator is the number of projects, and the denominator is the share of the region in a particular industry in %.

Table 1. Regional PPP profile by industries and spheres of activity (2019)

Regions	Utilities	Health care	Agriculture, forestry, fisheries	Culture, sports, tourism, information space	Transport and communications	Education	Other industries	Total
East Kazakhstan	3/1	5/2	-	2/1	6/3	205/92	2/1	223/100
Almaty city	2/3	3/5	11/19	5/8	7/12	31/53	-	59/100
Kostanay	8/13	17/28	1/1	6/10	-	26/43	3/5	61/100
Akmola	6/11	4/8	1/2	-	2/4	40/75	-	53/100
Karaganda	6/6	51/49	3/3	14/13	4/4	24/23	2/2	104/100
Kyzylorda	18/16	40/35	1/1	34/30	7/6	11/9	4/3	115/100
Turkestan	20/14	31/21	-	8/6	1/1	66/46	17/12	143/100
Pavlodar	13/19	23/33	-	6/9	1/1	15/21	12/17	70/100
Aktuibinsk	3/7	20/44	1/2	8/17	5/11	7/15	2/4	46/100
Almaty	10/24	5/12	7/17	8/19	3/7	5/12	4/9	42/100
Shymkent city	18/58	5/16	-	4/13	1/3	2/7	1/3	31/100
Mangistau	3/12	4/16	-	1/4	1/4	13/52	3/12	25/100
Nur-Sultan city	1/2	8/17	2/4	3/7	9/20	20/43	3/7	46/100
North Kazakhstan	2/4	8/14	-	4/7	2/4	38/69	1/2	55/100
West Kazakhstan	1/8	5/38	-	1/8	1/8	3/23	2/15	13/100
Atyrau	6/17	5/14	1/3	2/5	1/3	21/58	-	36/100
Zhambyl	1/1	31/27	-	3/3	-	78/69	-	113/100

Source: compiled by authors according to the source Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

Most of the projects are being implemented in East Kazakhstan (18%), Turkestan (12%), Kyzylorda (9%), Zhambyl (9%) regions; least of all - in West Kazakhstan region (1%), Mangistau region (2%), Shymkent city (3%), Atyrau region (3%).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

It follows from the above data that there are regions leading in the total number of projects, but projects there are not being implemented in all sectors. The most diversified sectoral structure of PPP is in Kyzylorda, Karaganda, Aktobe, Almaty regions and in the city of Nur-Sultan. All over the world, PPP schemes are very often used in connection with the construction of healthcare facilities, education, in the field of transport and road transport infrastructure, during the reconstruction and construction of sports facilities. The popularity of PPPs in these areas is explained by a number of advantages for infrastructure projects as a whole: minimization of the project budget, the best price-quality ratio attractive to private investors, the use of the best management and construction technologies, and reduction of commercial risks due to the participation of the state in the project.

Also, private financial initiative in PPP projects for the business sector is becoming more common: as of December 31, 2019, 717 PPP contracts were concluded, of which 324 contracts were concluded by private initiative, which is 45%. The average amount of contracts (even if we remove the largest project - BAKAD) from the list, initiated by the state - is 2 billion tenge, while business initiates an average of 1 billion tenge. The amount of state obligations: GI - 362 billion tenge, PFI - 188 billion tenge, and this is a difference of 93%, with a quantitative difference of almost 50%. 235 new projects worth 156 billion tenge were concluded in Kazakhstan using the practice of public-private partnerships in 2019 alone.

In total, as of the end of 2019, 717 PPP agreements were concluded for a total amount of 1.6 trillion tenge, including 9 republican agreements for the amount of 910 billion tenge; 708 - local in the amount of 687 billion tenge (Figure 2). The sole shareholder of Kazakhstan JSC Public-Private Partnership Center is the Government of the Republic of Kazakhstan represented by the Ministry of National Economy of the Republic of Kazakhstan, whose mission is to create conditions for partnership between the state and business, develop and combine their potential for implementing PPP projects and increasing the volume of private investments in the country's economy.
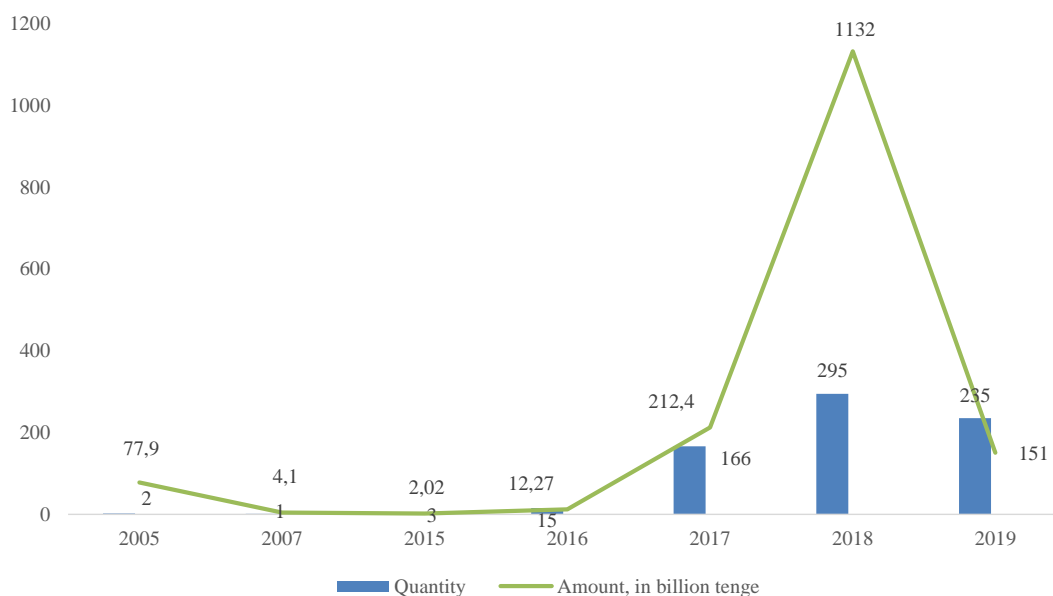
Figure 2. PPP Agreements in the Republic of Kazakhstan
for the period from 2005-2019
Source: compiled by authors according to the source Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

According to statistics from the Ministry of National Economy of the Republic of Kazakhstan, an estimated 8.7 million people were employed in the economy of the republic in July 2019. Among the employed population, the number of employees in the indicated period amounted to 6.6 million people (76.1% of the total number of employed). According to preliminary data of the second quarter of 2019, the share of productively employed people out of the total number of self-employed population was 90.3%, unproductively employed - 9.7%. For comparison, the indicators of the labor market of the Republic of Kazakhstan for the period from 2015-2019 were considered (Table 2) (Official site of Committee on Statistics).

Table 2. Main indicators of the labor market of the Republic of Kazakhstan

Indicators	2015	2016	2017	2018	2019
Labor force, thousand people	8962,0	8887,6	8 998,8	9 027,4	9 169,5
Employed population, thousand people	8510,1	8433,3	8 553,4	8 585,2	8 727,9
Employees, thousand people	6109,7	6294,9	6 342,8	6 485,9	6 612,0
Self-employed, thousand people	2400,4	2138,4	2 210,5	2 099,2	2 115,9
Unemployed population, thousand people	451,9	454,2	445,5	442,3	441,6
Unemployment rate,%	5,0	5,1	5,0	4,9	4,8
Youth unemployment rate,% (aged 15-24)	3,8	4,2	3,8	3,8	3,7
Youth unemployment rate,% (aged 15-28)	4,2	4,4	4,1	3,9	3,9
Long-term unemployment rate,%	2,4	2,5	2,2	2,2	2,2
Persons outside the labor force, thousand people	3715,9	3867,4	3 855,0	3 927,3	3 857,4

Source: compiled by authors according to the source Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

In the structure of the employed population, significant differences persist between urban and rural areas. Thus, 84% of the urban population are hired workers, the remaining 16% are self-employed. In rural areas, the share of hired workers is only 61%, and the share of self-employed workers is 39% (Table 3).

Table 3. Analysis of labor resources by employment status in 2019
(thousands of people)

Indicators	In urban areas	In the countryside	In general for the Republic of Kazakhstan
Employed population	4890,7	3662,7	8553,4
Employees, including:	4102	2240,9	6342,8
- at enterprises and organizations	3728,5	1952,9	5681,4
- for individuals	367	174,7	541,6
- in a peasant (farm) economy	,9	174,7	117,9
Self-employed workers, incl.	788,7	1421,8	2210,5
- employers	59,2	59,4	118,7
- independent workers	726,4	859	2080,9
- members of the cooperative	0,2	0,9	1,1
- helping (unpaid) workers in family businesses	2,9	6,9	9,8

Source: compiled by authors according to the source Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Let's analyze the influence of various factors on the unemployment rate in the Republic of Kazakhstan. For this we will use the method of analysis of variance.
First, let's analyze the impact on the unemployment rate of the place of residence (city or countryside). The required data are presented in Figure 3.
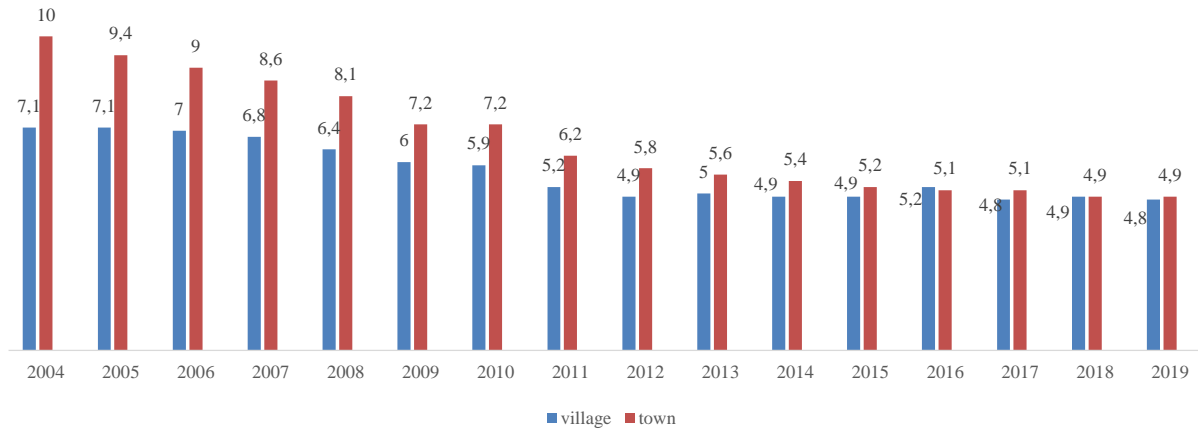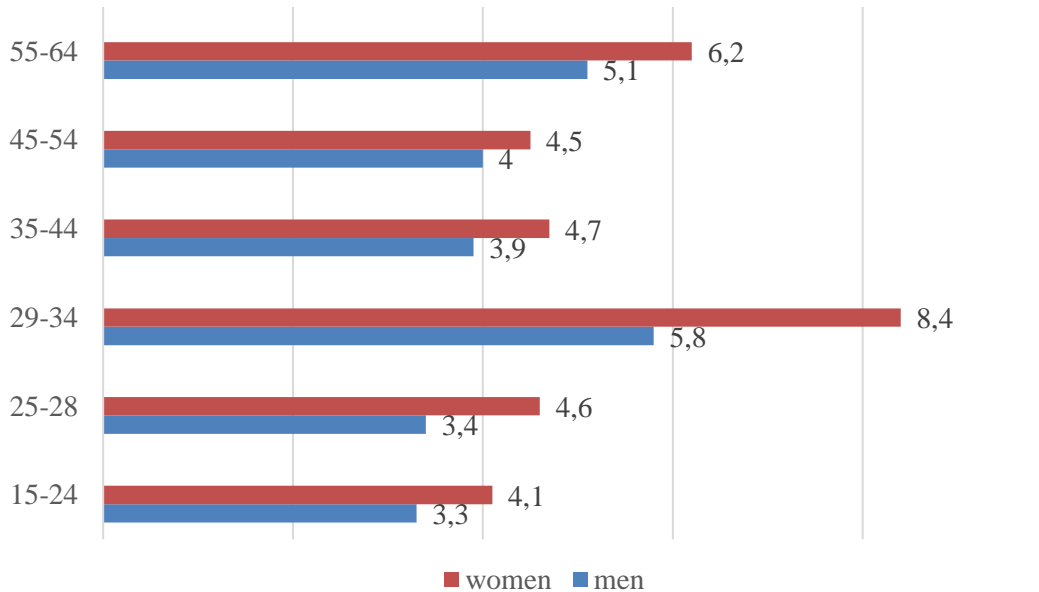

Figure 3. Dynamics of the unemployment rate in the Republic of Kazakhstan depending on the place of residence, in %
Source: compiled by authors according to the source Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

Statistics show that the urban unemployment rate is on average 1.05% higher than in rural areas.
Let us put forward and verify with the help of analysis of variance, a hypothesis about the influence of place of residence on the unemployment rate. Using statistical data, it was found that the factorial variance is $s^2_{fact.} = 8,820$, residual variance $- s^2_{res.} = 1,998$. So that $s^2_{fact} > s^2_{res.}$, then, in accordance with the considered method, it follows at the significance level $\alpha = 0,05$ check the significance of their differences. To do this, we calculate the observed value of the F-criterion:

$$F_{observ.} = \frac{s^2_{fact.}}{s^2_{res.}} = \frac{8,820}{1,998} = 4,414.$$

The critical value of the Fischer-Snedecor test at the significance level $\alpha = 0,05$ and the number of degrees of freedom $k_1 = 1$, $k_2 = 30$ equally $F_{crit.}(0,05;1;30) = 4,171$.
As $F_{observ.} > F_{crit.}$, therefore, at the significance level $\alpha = 0,05$ a conclusion should be drawn about the influence of the place of residence on the unemployment rate.

Let us analyze the influence of gender and age on the unemployment rate in the Republic of Kazakhstan, for this we apply a two-factor analysis of variance. The required data are presented in Figure 4.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Figure 4. Unemployment rate in the Republic of Kazakhstan depending on age and gender for 2019, in %
Source: compiled by authors according to the source Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

Thus, we see that the highest unemployment rate is observed in the age group from 29 to 34 years old. The unemployment rate for women in every age group is higher than for men, with an average difference of 1.17%.

Let us put forward and test, using two-way analysis of variance, a hypothesis about the influence of gender and age on the unemployment rate. Using the statistical data, we will carry out the necessary calculations. As a result, the following results were obtained:

- factor variance by factor «age»: $s_{age}^2 = 3,363$,

- factor variance by factor «gender»: $s_{gen}^2 = 4,083$,

- residual variance: $s_{res}^2 = 0,277$.

Let's compare the obtained values: $s_{age}^2 > s_{res}^2$, $s_{gen}^2 > s_{res}^2$. Since both found factor variances exceed the residual, in accordance with the ANOVA rule, it is necessary to calculate the observed values of the F-test:

$$F_{obs}^{(age)} = \frac{s_{age}^2}{s_{obs}^2} = \frac{3,363}{0,277} = 12,141, \quad F_{observ}^{(gender)} = \frac{s_{gender}^2}{s_{obs.}^2} = \frac{4,083}{0,277} = 14,740.$$

Critical values of the Fischer-Snedecor distribution at the significance level $\alpha = 0,05$ and the number of degrees of freedom for the factor «age» $k_1 = 5$, $k_2 = 5$, for factor «gender» $k_1 = 1$, $k_2 = 5$ equal to $F_{crit}^{(age)}(0,05;5;5) = 5,050$, $F_{crit.}^{(gender)}(0,05;1;5) = 6,607$.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

As $F_{obs}^{(age)} > F_{crit}^{(age)}$, a $F_{obs.}^{(gender)} > F_{crit.}^{(gender)}$, then at the significance level $\alpha = 0,05$ it should be concluded that both factors «gender» and «age» have a significant impact on the unemployment rate.

Thus, using analysis of variance, we proved that all the factors considered: "place of residence", "gender" and "age" affect the unemployment rate. First of all, it should be noted that there is gender inequality in Kazakhstan, the unemployment rate among women is higher. In addition, unemployment is subject to age differentiation. The largest percentage of unemployed is observed in the age groups from 29 to 34 years old and from 55 to 64 years old. In the latter case, this is due to the pre-retirement age. Also, the percentage of unemployed population in the city is higher than in the countryside. In the context of a significant outflow of the economically active population from the countryside to the city, not only the pressure on the urban labor market is increasing, but also significant changes are taking place in the social structure of the countryside, the deepening of social differentiation and transformation of rural society.

It should be especially noted that the preservation of the category of unproductively self-employed is a factor in increasing the economic burden on the country's budget system.

Regionally, 46% of the self-employed population is located in the Southern region, namely:
- Almaty (12.67%),
- Zhambyl (10.22%),
- South Kazakhstan (22.74%)
- Kyzylorda (5.5%).
The rest of the self-employed population is located:
- North (21.58%),
- Western (10.27%),
- East (9.09%),
- Central (3.31%).

The development of self-employment is driven by both economic and social factors. On the whole, a positive downward trend in the number of the self-employed population remains against the background of an increase in the number of employees.

In 2019, the rate of coverage of the economically active population (hereinafter - EAP) of the country with higher education is higher than 2004 by 9.6%. A significant increase was recorded in 2018 (Figure 5).
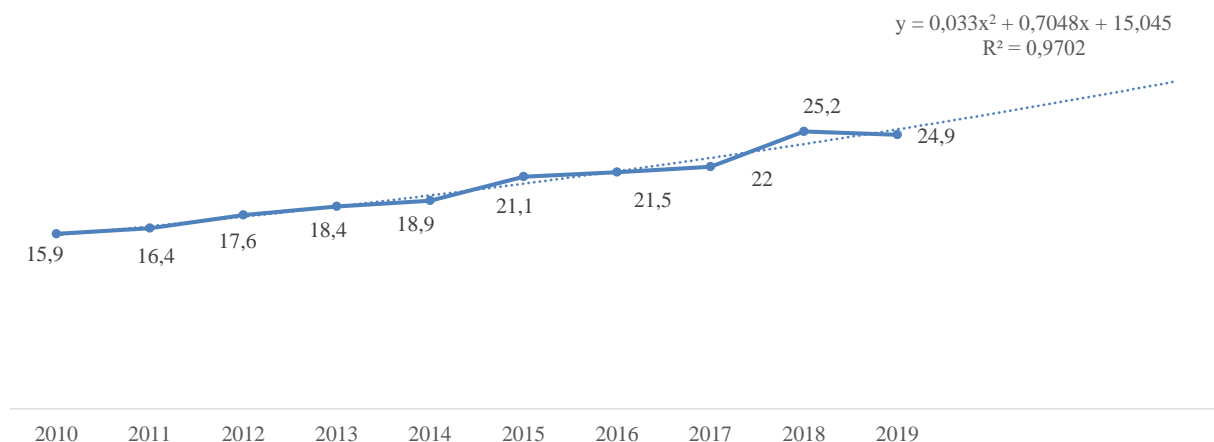
Figure 5. Share of the EAP of the Republic of Kazakhstan with higher education, in %
Source: compiled by authors according to the source Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

The quality of qualified personnel depends, of course, on the quality of higher education, which stakeholders interpret in different ways:
1. The State Program for the Development of Education and Science prioritizes training, employment and positioning of Kazakhstan universities in the QS WUR international ranking. This ranking focuses on academic reputation, taking into account the survey of experts, employer ratings, faculty / student ratio, the number of international students and faculty, and the citation index. National accreditation agencies in the quality assurance standards of the university also include effective strategic planning, management and information management, student orientation, quality of educational programs, teaching staff, research work, resources, public information, periodic external quality assurance (Standards for Institutional Accreditation).
2. GIK WEF optimally determines the quality of the educational system as consistency between educational programs, graduates' end results and the needs of the labor market. Kazakhstan took the overall 56th place in the fifth direction of the GIK 2018-2019 "Higher education and vocational training" focus on educational coverage, the quality of mathematical and natural science training of applicants, management schools and the possibility of continuing education on the job.
Table 4 shows a comparative analysis in the context of regions in terms of such indicators as the age structure, the proportion of young specialists, the number of IEPs who have undergone advanced training (Nurlanov, Amankazy, Nogaybaeva, 2018).

Table 4. Comparative analysis by regions of the Republic of Kazakhstan

Region	Share of IPR, age structure, in %	Number of IPRs who have completed advanced training courses, people		Share of young professionals in the TVE system, in %
		Number of managers, people	Number of IPR, people	
Akmola	8,7	18	280	8,8
Aktuibinsk	5	16	250	10
Almaty	9,5	26	400	8,7
Atyrau	11,4	12	200	11,5
West Kazakhstan	6,6	18	210	7,8
Zhambyl	4	18	310	8,3
Karaganda	7	31	480	8,9
Kostanay	8,5	22	280	7,5
Kyzylorda	5,6	11	240	8,9
Mangistau	10	9	140	10
South Kazakhstan	5,9	28	560	9,2
Pavlodar	10,2	22	300	13,8
North Kazakhstan	8,4	14	180	5,6
East Kazakhstan	11,3	32	360	8
Astana city	8,3	8	260	11,4
Almaty city	10,7	15	450	16,6

Source: compiled by authors

According to the data in Table 4, in the context of regions, it can be seen that an increase in the share of IRP of retirement age takes place almost everywhere. A significant increase in this indicator is observed in the East Kazakhstan region and in Almaty. At the same time, there is a decrease in this indicator in Atyrau and Kyzylorda regions. In terms of types of economic activity, the largest number of job vacancies is:
-in industry - 8,599 units;
- in the field of transport and storage - 3,999 units;
- the smallest - in transactions with real estate - 197 units (Table 5).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Table 5. Vacant jobs and expected need for workers by economic activity and type of ownership as of 2019 in Kazakhstan

Indicator	Number of vacancies at the beginning of the reporting period, units	including		
		state property	private property	foreign property
Total	28 305	1 538	8 458	1 243
Agriculture, forestry and fisheries	399	-	-	-
Industry	8 599	76	2 360	414
Construction	1 830	-	1 694	-
Wholesale and retail trade; repair of cars and motorcycles	2 090	x	802	x
Transport and storage	3 999	x	x	15
Accommodation and food services	453	-	112	69
Information and communication	1 091	-	140	101
Real estate operations	197	x	155	x
Professional, scientific and technical activities	1 099	54	101	123
Administrative support activities	1 716	x	625	x
Education	1 394	373	117	-
Healthcare and social services	4 526	744	x	x
Arts, entertainment and recreation	912	76	x	x

Source: compiled by authors

The highest expected staffing requirements are noted:
- in industry (2 850 people);
- in construction (1,694 people);
- in the field of art, entertainment and recreation (1 239 people);
- in the sphere of wholesale and retail trade, car and motorcycle repair (1,199 people) and the share of these types of economic activities in the total expected need for workers was 62.1%.
At enterprises and organizations with private ownership, the expected need for workers in 2019 was 8,458 people, of which:
- in industry - 2,360 people;
- in construction - 1,694 people;
- in the sphere of wholesale and retail trade, car and motorcycle repair - 802 people.
At enterprises and organizations with a state form of ownership, the greatest need falls on the sphere of health care and social services (744 people). Their share in the total expected demand for workers at state-owned enterprises was 48.4%.
According to the Project "Productive Employment", the improvement of the quality of education and, accordingly, the training of qualified personnel must be carried out through:
1. Modernization of educational programs:
- development of innovative educational programs, including the training of IT specialists with competencies in cybersecurity, web design, promotion in social networks;

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

- implementation of minor programs in priority sectors (for example, an educational program in the agro-industrial complex + trade) + maintaining the current state order for industries where there is an outflow of personnel;
- expanding the activities of universities in the implementation of short-term training courses;
- staff mobility (including student mobility, since the attraction of foreign students today is perceived as one of the important indicators of the competitiveness of higher education. This phenomenon is called internationalization of higher education) (Gaidarova, Ashimkhanova, 2016).
2. Development of dual learning.
3. Development of lease financing instruments and the creation of specialized competence centers, laboratories and classrooms of the "new format".
4. Systemic measures to organize the training of qualified personnel, taking into account the new structure of employment:
- restructuring the volume of the state order for training personnel with higher education and vocational education (Program of productive employment and mass entrepreneurship, project Free TVE) for the service economy, taking into account the new structure of employment (Law of the RK, 2018);
- increasing the attractiveness of training courses for blue-collar occupations by introducing an educational Internet platform, digital educational resources.

So, for example, within the framework of the Project "With a Diploma to the Village!" since 2009, measures have been taken to provide social support for specialists in education, health care, social security, culture and sports, and the agro-industrial complex who have arrived to work and live in rural areas (Figure 6) (Program of the President, 2015).
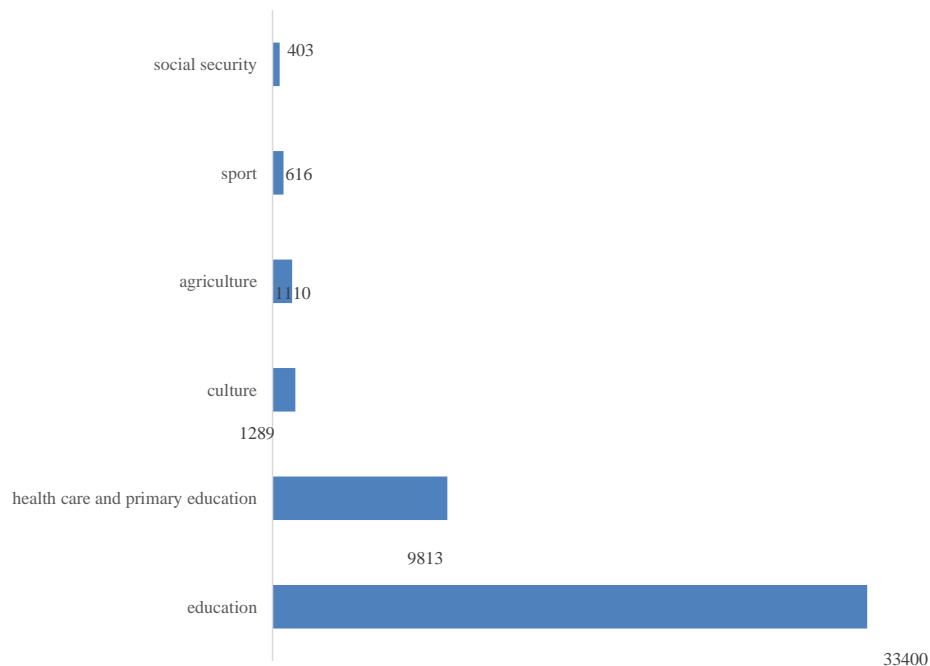
Figure 6. Dynamics of arrived specialists in Kazakhstan under the project "With a diploma in the village!" in the context of industries
Source: compiled by authors

For such specialists, it was provided:
- payment of a one-time lifting allowance in the amount of 70 MCI;
- a budget loan in the amount of 1,500 MCI for the purchase or construction of housing for a period of 15 years, with a remuneration rate of 0.01%;
- an increase by at least 25% of official salaries (tariff rates) for specialists of social institutions located in rural areas.

We would like to note that in 2018, the amendments to the Law of the Republic of Kazakhstan "On migration of the population" established an integral system for regulating the resettlement of citizens. In order to eliminate the disparities in the settlement of the population, it was envisaged to provide economic incentives for the voluntary resettlement of the population from labor-surplus regions to regions with a high potential for the development of the labor market, reception of migrants, with the provision of measures of state support and assistance in employment (Law of the RK, 2018).

Thus, the stable development of the socio-economic situation in the country is facilitated by the mobility of labor resources as one of the main solutions for the optimal use of labor resources in regions with a shortage of labor by moving them from labor-surplus areas. This enables individuals to find a better job offer. Labor resources are one of the most important factors in any production. Their condition and effective use directly affects the final results of the socio-economic development of the state (Berglund, 2017).

Conclusions

The problem of developing the public services sector through the introduction of public-private partnership mechanisms is an urgent task.

In the modern sense, PPP is an institutional and organizational alliance between the state and business in order to implement national and international, large-scale and local, but always socially significant projects in a wide range of areas of activity: from the development of strategically important industries and research and development (R&D) before providing public services.

For the development of public-private partnerships and the implementation of projects similar to the above in the regions of Kazakhstan, it is necessary to create favorable conditions for the formation of this institution. Among the main factors hindering the widespread use of PPP mechanisms in the economy of Kazakhstan are the following reasons:

1) insufficiently developed regulatory and legal framework;
2) the absence of mechanisms for effective financing and insurance of projects equally for all market participants, a significant political component for the implementation of long-term projects;
3) ineffectively functioning legal institutions that could guarantee the rights of private owners participating in projects;
4) limited access of potential PPP participants to large projects due to the high requirements imposed on them by the state;
5) low level of diversity and underutilization of the potential of promising forms and instruments of public-private partnership, which significantly limits the possibilities of its use.

Analysis of the current state of public-private partnership in relation to labor mobility and the prospects for its development within the framework of the general strategy of the third modernization allows us to determine the following main goals of regulating these processes.

1. Meeting the needs of the economy in the necessary labor force, subordinating migration to the solution of medium and long-term goals and objectives of the country's socio-economic development.
2. Formation of an optimal system of population settlement in the territory of the Republic of Kazakhstan.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

3. Ensuring the national security of the Republic of Kazakhstan in the context of threats associated with migration. To achieve the set goals, the following tasks will be required:

1. Building an effective system of external labor migration, focused on meeting the needs of the country's economy, creating a favorable investment climate and improving the quality of labor resources.

2. Updating the policy of ethnic migration, taking into account the strategic development plans of Kazakhstan in order to strengthen national consolidation and create favorable adaptation and integration conditions for ethnic repatriates arriving in the Republic of Kazakhstan.

3. Suppression of illegal migration.

4. Creation of an effective internal migration management system for the purpose of economically justified settlement of the population, ensuring regional and demographic balance in the development of the country.

Approaches to the creation of a modern system of public-private partnership in relation to the management of labor mobility require rethinking and further development.

This study confirms the fact that the issue of increasing the development of public-private partnerships in relation to labor mobility should be included in the general labor market policy; to solve it, additional systems of programs and measures should be used. Such programs and measures include passive and active measures that can be combined to stimulate job seekers to make decisions in favor of moving to a new job in a new location.

Consequently, among the main tasks of public-private partnership, it is necessary to highlight:

- "updating the system of legal regulation of employment and labor relations through changes and amendments to labor and social legislation, orientation of people to an independent active position of citizens in the field of employment and guarantees of social protection to the most vulnerable categories of citizens;

- "macroeconomic regulation of the economy, that is, improvement of the sectoral structure of the economy based on the creation of new industries and the reform of promising ones through privatization, reorganization, re-profiling, implementation of financial and tax policies, consistent with an employment policy that supports the creation of additional jobs;

- "support and active stimulation of the development of small and medium-sized businesses that create additional jobs, including by attracting foreign capital;

- "the formation of a system of social partnership of the main participants in the labor market - the state, employers, workers in ensuring employment guarantees, decisions on wages, working conditions and regimes.

Thus, it is necessary to improve the scientific and methodological foundations of public-private partnership, to develop and create conditions for a wider practical application of mechanisms, models of PPP in cities, adopting the advanced experience of developed countries, in the implementation of socially significant projects.

References

Ablaev, I., Akhmetshina, E. 2016. The role of the public private partnership in the innovation cluster development. Journal of Economics and Economic Education Research, 17 (4), 220–232. https://doi.org/10.14258/201849

Akintoye, A., Beck, M., Kumaraswamy, M. 2016. Public Private Partnerships: A Global Review. Taylor and Francis, 412 p. https://doi.org/10.4324/9781315686516

Berezin, A., Sergi B., Gorodnova, N. 2018. Efficiency assessment of public-private partnership (PPP) projects: The case of Russia. Sustainability, 10 (33), 1–18. https://doi.org/10.3390/su10103713

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Berglund, Th. 2017. Promoting labor mobility in the labor markets of the Republic of Kazakhstan and the Russian Federation. Moscow: Yurait, 93 p.

Bogdashkina, I., Kuspanova, A. 2018. Efficiency of state programs in solving problems of employment of the population. Actual problems of our time: science and society, 4(5), 8-14.

Bychin, V. 2017. Labor Economics. Moscow: Infra-M, 336 p.

Chagina, E. 2017. Problems of analysis and evaluation of the effectiveness of programs of territorial mobility of labor resources. Problems of modern economy, 4 (164), 157-159.

Cong, X., Ma, L. 2018. Performance evaluation of public-private partnership projects from the perspective of Efficiency, Economic, Effectiveness, and Equity: A study of residential renovation projects in China. Sustainability, 10(33), 1–21. https://doi.org/10.3390/su10061951

Cruz, C., Marques, R. 2014. Theoretical considerations on quantitative PPP viability analysis. Journal of Management in Engineering, 30 (1), 122–126. https://doi.org/10.1016/S2212-5671(15)00609-7

Dmitriev, Yu. 2015. Improving the quality of the labor force is a necessary condition for economic growth. Bulletin of the Vladimir State University, 1 (3), 111-117.

Domalatov, E., Dubina, I., Turginbayeva, A. 2018. State and development of public-private partnership in the innovation sphere of Kazakhstan: comparison with international practice. Economics, 4 (9), 21-29. https://doi.org/10.14258/ 201849

Efimov, E. 2017. Public - private partnership: problems in the relationship between the state and business. Internet journal "Science", 5(7), 32-39. http://dx.doi.org/10.15862/143EVN515

Eliseeva, I. 2018. Statistics. Moscow: Yurait, 565 p.

Gaidarova, N., Ashimkhanova, D. 2016. National report "Youth of Kazakhstan - 2016". Astana, 201p.

Isakhova, P. 2015. Public-private partnership in Kazakhstan as a tool for the development of investment activities. Bulletin of MIEP, 1 (18), 64–67.

Javed, A., Lam, P., Chan, A. 2014. Change negotiation in public-private partnership projects through output specifications: an experimental approach based on game theory. Construction Management and Economics, 32(4), 323–348. https://doi.org/10.1080/01446193.2014.895846

Law of the Republic of Kazakhstan "On migration of the population". 2018. Retrieved from: https://www.zakon.kz/

Mazin, A. 2017. Labor Economics. Moscow: UNITI-DANA, 575 p.

Menshikova, M., Abbas, A. 2017. Analysis of strategies for improving the quality of labor force. Auditorium, 2 (12), 89-96.

Nurlanov, E., Amankazy, M., Nogaybaeva, M. A. 2018. National report "On the state of development of the education system of the Republic of Kazakhstan". Astana: JSC IAC. 434 p.

Official site of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan. http://www.stat.gov.kz

Program of the President of the Republic of Kazakhstan. 2015. "Plan of the nation - 100 concrete steps". Retrieved from: https://www.zakon.kz/.

Roumboutsos, A. 2015. Public Private Partnerships in Transport Infrastructure: An International Review. Transport Reviews, 35(2), 111–117. https://doi.org/10.1080/01441647.2015.1017025

Shadrintseva, A. 2015. Development of the institution of public-private partnership in the field of improving the quality of labor and promoting employment of the population. Bulletin of SGUGiT, 3(31), 122-128.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Shlafman, A. 2013. Genesis of the integration processes in economy of the Russian Federation: problems of cyclicity and state regulation. Scientific and technical Bulletin of St. Petersburg state Polytechnic University, 1(185), 39-47.

Shlender, P. 2019. Labor economics. Moscow: Yurait, 686 p.

Shmelev, S., Sagiyeva R., Kadyrkhanova, Z., Chzhan, Y., Shmeleva, I. 2018. Comparative sustainability analysis of two Asian cities: A multidimensional assessment of Taipei and Almaty. The Journal of Asian Finance, Economics and Business, 5(3), 143–155. http://doi.org/10.13106/jafeb.2018.vol5.no3.143.

Simonova, M. 2018. Improving the quality of the workforce is the basis of personnel development. Development of the institution of a reserve of managerial personnel in the constituent entities of the Russian Federation as a challenge of the time and an effective tool for improving state personnel policy, Samara, Working papers, 8(19), 224-229.

Standards for Institutional Accreditation of Higher Education Organizations. 2017. IQAA

Statistical collections of Global Labor Market Trends. 2018. Human Resource Development Center.
Ullah, F., Ayub, B., Siddiqui, S., Thaheem, M. 2016. A review of public-private partnership: critical factors of concession period. Journal of Financial Management of Property and Construction, 21 (3), 269–300. https://doi.org/10.1108/JFMPC-02-2016-0011

Volgin, Yu. 2018. Labor Economics: Social and Labor Relations. Moscow: UNITI-DANA, 736 p.

Raikhan NURANOVA is PhD student of Narxoz University, Almaty, Kazakhstan. Research interests: labour, lbour market, economic development, macroeconomics.
ORCID ID: orcid.org/0000-0002-5321-1165

Maira RYSKULOVA is Candidate of Economic Sciences, Professor of of Narxoz University, Almaty, Kazakhstan. Research interests: finance, macroeconomics, innovation, strategic planning.
ORCID ID: orcid.org/0000-0002-1944-5339

Kulyash AIDARKHANOVA is Candidate of law, Associate professor of Al-Farabi Kazakh National University, Almaty, Kazakhstan. Research interests: economics, entrepreneurship regulation, innovation.
ORCID ID: orcid.org/0000-0002-6392-4708

Nurgul BAIGELOVA is Candidate of law, Associate Professor of the Kazakh University of Narxoz University, Almaty, Kazakhstan. Research interests: labour, lbour market, economic development, macroeconomics.
ORCID ID: orcid.org/0000-0001-5163-7077

MONITORING OF INDUSTRIAL ENTERPRISES' PERFORMANCE IN EMERGING ECONOMY: A CASE STUDY

Ainur Karipova[1], Kabdullina Gulmira[2], Gizat Kenesheva[3], Madina Tursumbaeva[4], Saltanat Kapysheva[5], Zhanna Nurgalieva[6]

[1] Gumilyov Eurasian National University, Nur-Sultan, Kazakhstan
[2] South Ural State University, Russian Federation
[3] Karaganda Economic University of Kazpotrebsoyuz, Karaganda, Kzakhstan
[4,5,6] Kazakh University of Economics, Finance and International Trade, Nur-Sultan, Kazakhstan

E-mails:[1] karipovaainur@mail.ru; [2]Asilhan1996@mail.ru; [3] gizzat@yandex.ru; [4]tursumbaeva_m@mail.ru; [5]saltik_ksk@mail.ru; [6]zhannanurgali@mail.ru

Abstract. Business monitoring and reporting issues receive close attention. Nationalization of indicators, creation of a statistical database, determination of data sources and methodology for their calculation are in the priority of state policy, especially in a crisis, when enterprises are required to improve production efficiency, competitiveness and effective forms of management in production management. An important role in the implementation of this task is assigned to monitoring the financial condition of enterprises, since it is one of the most effective methods for diagnosing the economic activity of enterprises. Analytical materials prepared during the monitoring process help to carry out a comprehensive analysis and forecast of the financial position of the enterprise and, thereby, to obtain a real assessment of the enterprise's capabilities.The article examines the current state of industry in Kazakhstan, analyzes the problems hindering its development, presents the author's vision of their solution. On the basis of modern scientific and applied literature, various approaches to the formation of the concepts of financial monitoring, methods of analyzing the financial condition of an organization are widely presented.

1. Introduction

Over the years of independence, Kazakhstan, being a rapidly emerging economy, has implemented a number of systemic and structural economic reforms and carried out large-scale privatization. Free development of entrepreneurship has shaped the economy, which has provided real growth in the welfare of citizens. As a result, by the middle of the first decade of the new century, Kazakhstan became one of the most dynamically developing countries in the world. This was also facilitated by the favorable conjuncture of the global resource market, which ensured a rapid growth in production, an increase in the level of income of the population and social transfers, and the formation of a middle class.

The country has now accelerated the transition to diversified economic growth, where efforts and resources are concentrated on a limited number of sectors, taking into account regional specialization and the application of a cluster approach. In the future, it is planned to converge the policy of territorial and industrial development. Kazakhstan has taken a course towards increasing the productivity and complexity of the economy, developing human capital, strengthening the role of the private sector, which will allow the country to overcome the "middle income trap" and reach a new level of development.

Despite the favorable dynamics of industrial development in 2019, the impact of the global financial crisis, as a result of the pandemic, had an impact on the economy. Despite some indicators of economic recovery, there is still uncertainty about future economic growth, availability of capital, as well as the cost of capital, which could negatively affect the company's financial position, results of operations and economic prospects (N.S., Jiran, H., Gholami, S., Mahmood, M.Z.M., Saman, N.M.,Yusof, V., Draskovic, R. Javovic, 2019). Although the management and management of the companies are confident that they are taking appropriate measures to maintain the sustainability of the company in the current environment, an unexpected further deterioration could have a negative impact on the financial results and financial position of the company's industries.The experience of developed countries has shown that in the conditions of an unstable economic situation and heightened competition, the presence of an effective mechanism for monitoring the financial condition in a company becomes an essential condition for the stable and successful development of a company. Forming operational information on the basis of systematic analysis, monitoring provides the basis for making optimal management decisions, assessing their consequences even before implementation and predicting the further development of the organization.Crisis phenomena in the world economy require industrial enterprises to increase production efficiency, competitiveness, and effective forms of management and production management. An important role in the implementation of this task is assigned to monitoring the financial condition of enterprises, since it is one of the most effective methods for diagnosing the economic activity of enterprises. Analytical materials prepared during the monitoring process help to carry out a comprehensive analysis and forecast of the financial position of the enterprise and, thereby, to obtain a real assessment of the enterprise's capabilities. In Kazakhstan, the collection of information and analysis of the state of development of entrepreneurship and the business climate is carried out mainly according to the data of international rating agencies, which reflect indicators only at the republican level, as well as on the basis of the results of market surveys, which are one of the forms of statistical observations. But as a process of constant monitoring in order to identify the compliance of the development of entrepreneurship with the set tasks, it is practically not carried out either at the sectoral or at the regional levels.

Currently, in Kazakhstan, monitoring of the main financial and economic indicators of enterprises is carried out by various government agencies. The Committee on Statistics monitors the main indicators of large and medium-sized enterprises, prepares and publishes monthly statistical data characterizing the main indicators of the financial and economic activities of medium and large enterprises by type of economic activity: income from sales of products

and services, cost of goods sold and services rendered, non-production expenses, profit (loss) before taxation, profitability (loss ratio) of production. It also publishes monthly information on the state of mutual settlements of enterprises by type of economic activity, quarterly dynamics of accounts receivable and liabilities of large and medium-sized enterprises, dynamics of financial results, share distribution of enterprises that received income and loss for a certain quarter.Research conducted by government agencies allows to obtain mainly statistical data, analytical results characterizing the most important market indicators, and does not provide complete information to assess the financial condition of the enterprises under study, that is, the monitoring carried out by these organizations, the co-organizers, does not provide funding.Thus, for a more complete diagnosis, timely detection of crisis situations in the economy, external state monitoring of the financial condition of enterprises is required.At present, the state exercises only control over the bankruptcy procedure of insolvent enterprises. Analysis of trends at the enterprise level in the production of goods, services and aggregation at the macro level allows reinforcing dynamics and improving forecasting of macro indicators.

2. Literature review

According to the research of M.A. Batkovsky, P.V. Kravchuk (2019) the problems of creating a system for monitoring the activities of enterprises are due to the insufficient development of the scientific and methodological base for monitoring the activities of enterprises, since at present, there is no generally accepted concept of it, a unified terminology, etc., which reduces the effectiveness of monitoring in practice. When introducing a monitoring system for the activity of an innovatively active enterprise, the problem of determining the basic principles of creating this system is acute. Based on the analysis of various sources and practice of creating monitoring systems Yu.S. Shiryaeva, L.N. Pertseva, E.N. Lapshina, E.A. Lapshin (2017) propose to use principles that significantly increase the level of decision-making risk in the process of introducing a monitoring system at innovative-active enterprises.Many aspects related to the justification of assessment methods and ways to increase the potential of the enterprise are poorly studied and insufficiently researched. In this connection, there is a need to search for a methodology for assessing the economic potential of an enterprise that allows it to function effectively in market conditions (Dzhamay, 2017). According to M.A. Soldatova, L.E. Lazarenko, O.A. Stepanova (2015) industrial enterprises, especially those that are private property, carry out their activities not only in their own interests, but also in the interests of shareholders, which imposes certain requirements on the management system, including on the system for monitoring the economic condition, since it is precisely on the reliability and timeliness of providing information about the functioning of the enterprise depends on the effectiveness of management activities.The analysis of the main models for the formation of competitive advantages made it possible to formulate a hypothesis about the advisability of applying a systematic approach to assessing the factors influencing strategic behavior. The basis for modeling assessment methods is the field of monitoring the strategic potential, which consists of the coordinate planes of the assessment of elements that allow forming the strategic potential of industrial enterprises as the uncertainty of the business environment, the efficiency of the business network, and integration potential.V. Zhuravlyov, T. Khudyakova, N. Varkova, S. Aliukov, S. Shmidt (2019) improved and proposed model that determines the interdependence between the strategic management of investment policy and sustainable economic development of the company, which represents an algorithm for managing the process of developing investment strategies in industry. Many scientists propose methods for monitoring the sustainable development of industrial enterprises (P. Chowdhury, Paul Sanjoy, K., 2020). So, E.A.Tretyakova, T.V. Alferova (2016) proposed a methodology for assessing the level of sustainable development, implemented in the algorithm and a group of indicators of the enterprise. The calculation of single indicators of sustainable development in the economic, environmental and social spheres was carried out, then in statics - the determination of their normalized values, in dynamics - the calculation of the rate of their change and the construction of dynamic standards with their use. The calculation of group static and dynamic indices for each sphere and the calculation of integral static and dynamic

indices were made. Combining static and dynamic assessments made it possible to display the trajectory of movement of the positions of each of the enterprises in the matrix of complex assessment of the level of sustainable development of an industrial enterprise.Many scientists pay special attention to the analysis of information sources to assess the innovative potential, where they analyze the existing forms of statistical reporting and propose indicators that need to be obtained, where the decision-making methods that provide information, psychological, social and economic security of the information technology implementation process are taken as a basis (Bogatenkov, Belevitin, Khasanova, 2018). Many scientists propose methods for monitoring the sustainable development of industrial enterprises. So, A. Limp, A. Loureiro Rezende, A.Versian (2018) and A.N., Neculaesei, M., Tatarusanu, B., Anastasiei, N., Dospinescu, M.V., Bedrule Grigoruta, A.M. Ionescu, (2019) proposed a methodology for assessing the level of sustainable development, implemented in the algorithm and a group of indicators of the enterprise. H. Cuevas-Vargas, N. Parga-Montoya, R. Fernández-Escobedo (2016) in their research paid special attention to the analysis of information sources to assess the innovative potential, where he analyzes the existing forms of statistical reporting and offers indicators that must be obtained through a survey of companies.

Monitoring the financial condition is one of the most important functions of financial management to assess (analyze) the availability, placement and use of the company's financial resources. Monitoring is a mechanism for financial managers to constantly monitor the most important current results of the company's financial activities in the context of constantly changing market conditions. When forming a monitoring system, it is necessary to highlight the monitoring object, that is, the object being monitored in order to control its financial condition, and the monitoring subject, which will directly monitor and evaluate the results. The concept of "monitoring" entered the scientific literature relatively recently - at the beginning of the 70s. XX century this term has been studied for a long time in relation to environmental problems. The term "monitoring" was used in connection with the processing of information about the state of the environment as a system of observation and control over changes in the natural environment as a result of human economic activity. With the development of market relations in the post-Soviet space, works appeared on the problems of monitoring in the economic sphere.Monitoring is a means and methods of control and supervision over the course of any processes or commercial activities of an enterprise, carried out by an entrepreneur in order to stabilize production parameters".The study of the issues of monitoring the financial condition of enterprises was developed in the works of many authors, e.g. A.B. Rakhimbaev, E.E. Mikhel (2016).According to V.V. Kovalev (2015), monitoring is understood as continuous observation of economic objects, the analysis of their activities as an integral part of management. Such scientists as e.g. T. U. Turmanidze(2015),S. Hilkevics, V. Semakina, V. (2019) in their works also touched upon certain aspects of monitoring the financial condition of the company. In their opinion, monitoring the financial condition of a company is a system for monitoring, analyzing and evaluating the financial condition of a company in order to identify trends, forecast development prospects, prevent crisis situations and make optimal management decisions.

E.N. Barikayev (2015) notes that the main goal of monitoring the financial condition is the timely identification of trends in the financial condition of the company and the assessment of development prospects.
V. Akulov, M. Rudakov (2015) and V. Branichev (2018) highlight the main tasks of monitoring the financial condition of the company:
- determination of the main financial indicators of the company for a certain period and their trends;
- analysis and evaluation of the results obtained;
- assessment of the effectiveness of the company's financial policy;
- timely identification and analysis of negative trends in the company's financial condition, assessment of the company's financial risks;
- prevention of crisis situations;
- forecasting the company's activities;

- justification of recommendations and proposals for improving the financial stability of the company, identifying reserves.

So, from the position of V.P. Gruzinov, V.D. Gribov (2015) monitoring of the financial condition of an organization, assessment of its solvency are a prerequisite for the implementation of state policy aimed at preventing the bankruptcy of organizations (enterprises), at financial recovery and restructuring of insolvency.According to K.I. Polikarpov (2018) the concept of "monitoring" is much broader than the concept of "analysis". Monitoring includes analysis, as one of the main stages of its implementation. K. Zhakisheva (2018) believes that financial monitoring (monitoring of financial condition) is a system of continuous control and analysis of the financial condition and results of the organization's work.Soldatova, M., Lazarenko, L., Stepanova, O. (2015) consider financial monitoring as a system of continuous monitoring, analysis and forecasting of indicators of the financial condition of enterprises, formed at the macro- or microeconomic levels, in order to ensure the adoption of tactical and strategic management decisions at the appropriate level, as well as to assess the effectiveness of decisions.M.M. Berdar also did not distinguish between the concepts of "financial analysis" and "financial monitoring". They note that based on the results of monitoring studies of various aspects of the enterprise's activities, managers and owners have the opportunity to start developing a reflexive model for the financial recovery of the enterprise.From the position of T. Grynko, O. Krupskyi (2017) monitoring the financial condition of organizations is a system of continuous monitoring of the financial condition, including the prompt collection of information, analysis of key financial indicators and the adoption, based on the analysis results, of management decisions of a preventive and prophylactic nature.Many authors believe that monitoring the financial condition of an enterprise is the most important tool for anti-crisis management of an enterprise. Thus, scientists A. Abeldanova, Z. Smailova (2017), R. Berstembaeva (2017), D. Tleuzhanova, N. Yemelina, A. Omarova (2018) believe that the implementation of constant monitoring the financial condition of an enterprise is a prerequisite for early detection of the symptoms of a financial crisis.From the point of view of other authors, monitoring of the financial condition of an enterprise is a system of continuous monitoring, analysis and assessment of the financial condition of an enterprise based on key financial indicators in order to identify trends, forecast development prospects, prevent crisis situations and make optimal management decisions (A. Babaytsev, E. Kuznetsova, L. Rabinskiy, O. Tushavina, 2020).Thus, the monitoring system should have a signaling, warning character, the essence of which is to identify, as a result of systematic diagnostics of the financial condition, the likelihood of insolvency or bankruptcy of enterprises.

3. Research questions

Monitoring the innovative potential of industrial enterprises and their innovative activity in the context of the development of competition and globalization of world commodity markets is of particular importance for the future development of the industry and industry of the country as a whole. When monitoring enterprises, a large number of different economic and financial indicators are analyzed. Some of the indicators are accessible and determine the activities of companies and the industry as a whole. Access to other indicators requires the maximum transparency of enterprise management.

Developing policies to create the conditions for balanced, environmentally friendly growth requires an understanding of the drivers of economic development, with due regard to sustainability, economic and social well-being. Responsible policymakers need information to monitor progress, plan future directions and evaluate results. Information, reflecting internationally comparable data and indicators, serves as a basis for developing new policies and promoting ideas and strategies.

Kazakhstan's introduction of a methodology for measuring and monitoring the progress of industrial enterprises allows for increased international cooperation, which means the dissemination of knowledge, exchange of

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

information and the development of common approaches to sustainable growth. Effective monitoring and evaluation requires more than data. It is also necessary to build institutional capacity, clarify the functions of various government structures, create new state bodies as necessary and support research activities at the national level within the framework of policy priorities and measures for the development of industries in the Republic of Kazakhstan. Research questions raised in the paper are presented graphically below (see Figure 1).
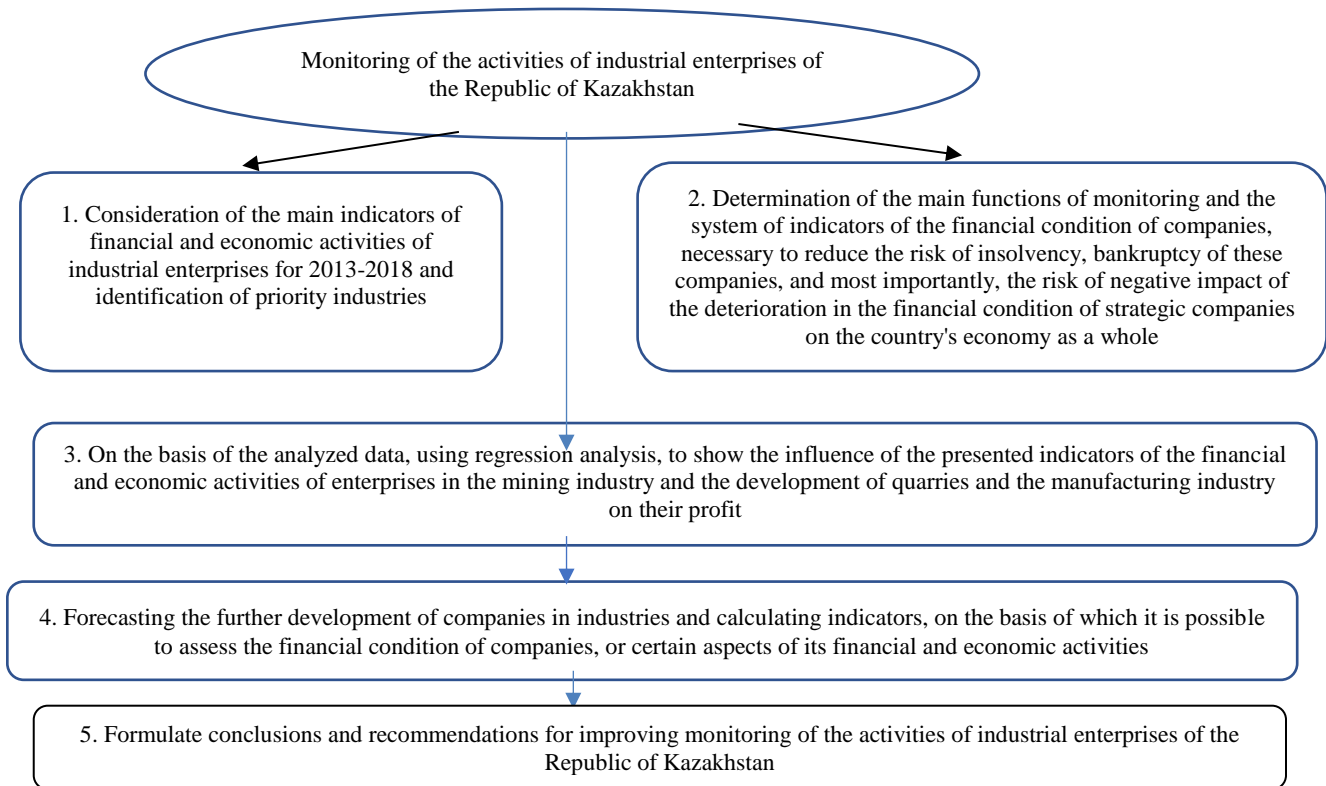
Figure 1. Research questions
Source: compiled by authors

4. Analysis and results of the research

At present, industry occupies almost one third of the structure of the economy of Kazakhstan. A high share of the mining sector provides more than 2.5% of employment and an average of 26.6% of GVA in the economy (Table 1).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Table 1. Structure of gross value added by industry in Kazakhstan (in %)

Industries	2013	2014	2015	2016	2017	2018	2019
Total	35 999, 0	39 675,8	40 884,1	46 971,2	53 101,3	60 004,5	67 805,0
Agriculture, forestry and fisheries, in billion tenge	1 621,2	1 717,8	1 925,9	2 140,0	2 315,2	2 700,0	2 915,6
%	4,5	4,3	4,7	4,6	4,4	4,5	4,3
Industry, in billion tenge	9 986,0	10 818,1	10 167,0	12 262,5	14 213,4	15 601,1	17 687,1
%	27,7	27,3	24,9	26,1	26,8	26,0	26,1
Construction, in billion tenge	2 145,3	2 358,0	2 447,7	2 758,8	2 896,7	3 360,3	3 729,3
%	6,0	5,9	6,0	5,9	5,5	5,6	5,5
Wholesale and retail trade; repair of cars and motorcycles, in billion tenge	5 416,0	6 332,7	6 994,0	7 898,8	8 440,6	9 600,7	10 916,7
%	15,0	16,0	17,1	16,8	15,9	16,0	16,1

Source: compiled by authors according to the source Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

Investments in fixed assets in the extractive industry today account for more than 30% of the total, and in the manufacturing industry only 12% (Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan). Kazakhstan, which is a leading exporter of extractive industry products (primarily due to the export of extracted oil), is ahead of all CIS countries in terms of per capita export. However, the average per capita export of manufacturing products in the Republic of Kazakhstan is relatively low - approximately two times lower than in Russia.At the end of 2019, compared to 2014, Kazakhstan shows a positive growth trend in terms of the main indicators: GDP grew by 75.3%, including industry - by 58.6%, construction - by 66.2%, agriculture, forestry and fisheries - by 63.9%, the volume of innovative products - 2.0 times, the energy intensity of GDP decreased by 13.6% (Table 2).

Table 2. Dynamics of the main indicators by the main target indicators for 2014-2019

Indicator	2014	2015	2016	2017	2018	2019
Industry, in million tenge	18 529225	14 903099	19 026781	22 790209	27 218063	29 380342
Construction, in million tenge	2 667 183	2 896 877	3 258 031	3 509 296	3 862 995	4 431 666
Agriculture, forestry and fisheries, in billion tenge	3143678,1	3307009,6	3684393,2	4070916,8	4474088,1	5151163,0
Share of innovative products (goods, services) to GDP, in %	1,46	0,92	0,95	1,59	1,98	1,89
Share of innovative products (goods, services) of industrial enterprises in the total volume of industrial production, in %	2,61	1,80	1,81	3,18	3,77	3,56
Share of innovatively active enterprises from the number of operating,%	4,0	4,0	4,3	7,1	7,6	7,3
Volume of innovative products, in billion tenge	580,4	377,2	445,8	844, 7	1 179, 2	1 235,3

Source: compiled by authors according to the source Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Economy of the Republic of Kazakhstan is one of the fastest growing in the CIS. The observed growth was largely due to large foreign investors in the oil and gas industry, the expansion of which had a positive impact on other industries. However, economic growth is still largely dependent on the growth of oil and gas production in Kazakhstan, as well as the global market conditions for these products (Official site of JSC "National Managing Holding "Baiterek ").

Kazakhstan ranks roughly 50th in the list of countries in terms of nominal gross domestic product. In 2018, the GDP of Kazakhstan amounted to 61.8 trillion tenge (3.4 million tenge per capita, or 9812.5 US dollars). For 9 months of 2019, the GDP of Kazakhstan amounted to 44.3 trillion tenge. The estimate of Kazakhstan's GDP for the full year of 2019 is 67.7 trillion tenge (Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan).

Figure 2. Analysis of GDP dynamics in Kazakhstan for the period from 2002-2019
Source: compiled by authors according to the source Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

In connection with the raw materials orientation and export orientation of the economy of Kazakhstan, its development is closely related to the situation in the market of raw materials, primarily oil and metals. From 2000 to 2011, Kazakhstan's GDP showed rapid real growth at double-digit levels with short-term adjustments in 2008-2009 due to the impact of the global financial crisis. From 2012 to 2014, the country's growth rates have stabilized at the level of 4-6%. Such dynamics of growth rates is explained by the significant consolidation of the country's economy against the background of high prices for oil and metals. In 2015-2016 there was a drop in GDP growth to 1.2 and 1.1%, respectively, as a consequence of the collapse in oil prices. At the same time, since 2017, there has been a recovery in economic growth indicators in Kazakhstan - slightly above 4% (Figure 2).

At present, industrial production in the structure of Kazakhstan's GDP is 44%. The volume of industrial production in monetary terms amounted to 27.2 trillion tenge. In the structure of industrial production, the leading positions are occupied by the mining and manufacturing industries - 54% and 38%, respectively (Figure 3).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Industrial production volumes since 2000 to 2015 increased annually by an average of 20%, but in 2015 there was a sharp decrease of 21% in relation to 2014.
The main reasons for the decline were the following factors:
- production volumes in the mining industry decreased by 33%;
- in the manufacturing industry decreased by 6%;
- in the field of electricity, gas, steam and air conditioning, production increased by 4%;
- in the sector of water supply, sewerage system, control over the collection and distribution of waste, production increased by 3%.
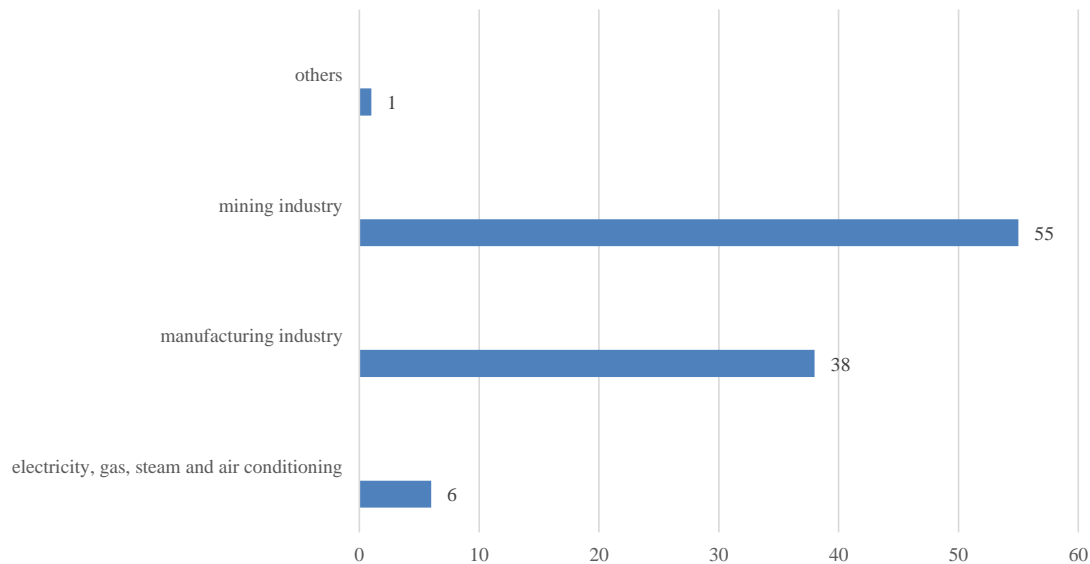
Figure 3. Structure of industrial production in Kazakhstan, in %
Source: compiled by authors according to the source Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

Since 2016 the volume of industrial production began to recover due to the increase in production volumes in all sectors. Thus, the average annual growth since 2016 is 22%. Business susceptibility to technological innovation remains low, but is growing moderately. In 2019, the share of innovatively active enterprises amounted to 7.3% of the total number of industrial enterprises, which is significantly lower than the values typical for Germany (73%), Ireland (61%), Belgium (58%), Czech Republic (41%) (Official site of Eurostat, 2019.). Qualitatively, the insufficient level of innovative activity is aggravated by the low return on the implementation of technological innovations. The expenditures of Kazakhstan companies on R&D (in% of GDP) remain extremely low 0.3% of GDP, which is even lower than the indicators of Russia 1.4%, Ukraine 0.9% and Belarus 0.7% (Official site of Eurostat, 2019). In addition to the "quantitative" lag of Kazakhstan companies in terms of innovation activity, there are significant structural problems in organizing innovation management at the company level.

The share of products of Kazakhstan companies in the global export of high-tech civilian products is zero. The reasons for the persistently weak positions of Kazakhstan companies are the lack of high-quality scientific research close to production and weak competencies and visions at the level of company leaders, who save on development, postponing innovative projects and R&D costs for an indefinite future.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

In Kazakhstan, the dependence of the state budget on revenues from oil exports continues to grow. Oil revenues account for more than 50% of the consolidated revenues of the state, and the budget deficit, excluding these revenues, reaches 9.3% of GDP. The transfer of the National Fund of the Republic of Kazakhstan provides financing for almost a fifth of all government spending.

Kazakhstan has come close to the problem of the "middle income trap". Upon reaching a certain level of well-being in the range from 10 thousand to 15 thousand US dollars of GDP per capita, the growth of the economy of the Republic of Kazakhstan may slow down. The economy may lose competitiveness and turn out to be a country with a low level of income. As the global experience of economic development shows, few countries manage to overcome the threshold of middle income: of more than 100 countries that quickly reached middle income half a century ago, only about a dozen have managed to become high-income countries. The main strategy for breaking through the "trap" is the accelerated development of industry, including manufacturing.

Thus, starting from 2010 to the present, the foundations of modern industrial policy in the Republic of Kazakhstan were laid. The main regulatory legal acts were adopted; various instruments for supporting industrial development and new policy directions were tested. In particular, mechanisms were launched to attract foreign direct investment and support exports, and the process of transforming special economic zones was launched. Diversification of the economy has begun through the accelerated development of the manufacturing industry, an increase in non-resource exports and the attraction of foreign direct investment in non-resource sectors. The production of more than 150 new types of products has been mastered. These are high-tech products of mechanical engineering, pharmaceuticals and chemical industries.

In modern conditions, when entrepreneurial activity is aimed at improving management mechanisms, at creating competitive advantages, it is necessary to analyze the activities of companies to identify hidden reserves and prevent possible financial threats. In a market economy, there is an objective need to identify trends in the development of the financial condition and prospective financial capabilities of the enterprise.

In this regard, the monitoring of the financial condition is carried out, which is aimed at assessing the condition of the objects under study in conditions of insufficient information in order to identify problems in the functioning of systems and the causes of their occurrence, where the assessment of the company's performance is an important part of the analysis of the company's financial condition within the framework of monitoring. In this regard, let us consider the main indicators of the financial and economic activity of industrial enterprises in 2013-2018 (Table 3).

Table 3. Main indicators of financial and economic activity of industrial enterprises in 2013-2018 (in mln. tenge)

Indicators	2013	2014	2015	2016	2017	2018
Profit (loss) before taxes						
Mining and quarrying	3 587590	3 896193	1 255610	2 369873	3 819446	6 295 007
Manufacturing industry	379 103	315 367	-382 511	1 163171	1 325462	1 219 902
Income from the sale of products and the provision of services						
Mining and quarrying	9 684522	10 094638	6 857698	8 608846	10 305442	13 317 567

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Manufacturing industry	4 891974	4 932510	4 461696	6 358983	7 486506	8 446 819
Cost of goods sold and services rendered						
Mining and quarrying	3 729112	4 038598	3 327398	4 198140	4 405439	5 268 474
Manufacturing industry	3 822736	3 653639	3 275786	4 346626	5 016486	5 636 716
Debt on obligations						
Mining and quarrying	3 977449	4 306648	6 684909	8 737147	8 325743	9 375 074
Manufacturing industry	3 537 717	4 585 871	6 348 099	7 520655	7 962131	8 455 645
Receivables						
Mining and quarrying	1 385864	1 270446	1 439869	1 325902	1 458080	1 476 967
Manufacturing industry	1 234013	1 232638	1 304282	1 938003	2 184200	2 249 550

Source: compiled by authors according to the source Official site of the Development Bank of Kazakhstan

Based on Table 3, it can be seen that the main share in all indicators is occupied by the mining industry and quarrying, so the income from product sales in 2018 compared to 2013 increased by 37.5% due to an increase in the average selling price and amounted to 13 317.6 billion tenge. In the manufacturing industry, income grew by 72.7%, reaching 8,446.9 billion tenge.

5. Application functionality

With the help of regression analysis, we will analyze the influence of the presented indicators of financial and economic activity of the mining industry and the development of quarries and the manufacturing industry on their profit. As a result of the analysis of the main indicators of financial and economic activity of industrial enterprises of the Republic of Kazakhstan, it was revealed that the main share in all indicators is occupied by the mining industry, quarrying and manufacturing. Therefore, for further comparative analysis of the two industries under consideration, authors set the task to show the difference between the formation of pre-tax profit by increasing income, which is necessary for more efficient cost management in the studied industries. For this, regression analysis was used using the least squares method, which made it possible to analyze the impact of the presented indicators of financial and economic activity in the mining industry, development of quarries and the manufacturing industry on their profit.

As explanatory factors, income from sales of products and debt on liabilities were selected, which, as a result of comparing the two industries under consideration, showed a significant difference between the formation of pre-tax profit by increasing income. The analysis of the monitoring showed that more efficient cost management is carried out in the mining and quarrying industries compared to the manufacturing industry. This indicates that monitoring the innovative potential of industrial enterprises and their innovative activity is of particular importance for the future development of the industry. In this regard, the monitoring of the financial condition is carried out,

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

which is aimed at assessing the condition of the objects under study in conditions of insufficient information in order to identify problems in the functioning of systems and the causes of their occurrence, where the assessment of the company's performance is an important part of the analysis of the company's financial condition within the framework of monitoring. Based on the analysis of the financial results of industrial enterprises, their business and market activity, it follows that the main attention of the financial management of enterprises should be paid to increasing the operating and net profit of the company, and due to this, the indicators of the company's profitability. As a result, authors formulated conclusions and recommendations for improving monitoring of the activities of industrial enterprises of the Republic of Kazakhstan, since the importance of monitoring affects the high rating of enterprises, allows them to have financial and economic advantages in the market of credit resources and investment funds, to receive promising government orders, to consistently increase the value of the enterprises themselves and their securities.

For this, the following hypotheses were formulated:
1. Analyzing the impact of indicators of financial and economic activities (income from sales of products and debt on obligations) of the mining and manufacturing industries on their profits.
2. Based on the analysis of the financial condition of industrial enterprises, predicting the indicators of production volumes and profitability of industrial enterprises, namely:
- forecast of the volume of investments in fixed assets of the industry;
- forecast of profitability;
- forecast of the amount of profit (loss) before tax.
3. Formulating conclusions and recommendations for improving monitoring of the activities of industrial enterprises of the Republic of Kazakhstan, which affects the financial and economic advantages in the market of credit and financial resources.

After assessing the statistical significance of the variables, income from sales of products and debt on obligations were chosen as explanatory factors.To build an econometric model, the statistical data of these indicators were used for the period from 2013 to 2018. The results of the regression analysis carried out using the least squares method are shown below (Table 4).

Table 4. Results of evaluating the pre-tax profit equation for mining and quarrying

R	0,999
R^2	0,998
Adjusted R^2	0,997
The observed value of the Fisher test	940,915
Critical Fisher's criterion	$9{,}552\,(\alpha = 0{,}05,\ k_1 = 2,\ k_2 = 3)$
Variables	
Profit before tax (million tenge) - dependent variable	
Constant	-4016044,104***
	Regression coefficients
Income from the sale of products and the provision of services	0,810***
Debt on obligations	-0,057***
* p<0,1; ** p<0,05; *** p<0,01	

Source: compiled and calculated by authors

The multiple correlation coefficients indicate a close relationship of the resulting trait with two factorial traits at the same time, and the corrected determination coefficient indicates that 99.7% of the variation in the dependent

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

variable is explained by the resulting regression. The equation as a whole, as well as its individual parameters, is statistically significant and reliable with a 95% probability.

The analysis of the obtained parameters of the multiple linear regression equation allows us to draw the following conclusions for mining and quarrying enterprises:
1) with an increase in income from the sale of products and the provision of services by 1 million tenge, profit before tax increases on average by 0.810 million tenge;
2) with an increase in debt on liabilities by 1 million tenge, profit before tax decreases on average by 0.057 million tenge (Table 5).

Table 5. The results of evaluating the equation of profit before tax for the manufacturing industry

R	0,894
R^2	0,799
Adjusted R^2	0,664
The observed value of the Fisher test	5,950
Critical Fisher's criterion	5,462 ($\alpha = 0,1$, $k_1 = 2$, $k_2 = 3$)
Variables	
Profit before tax (million tenge) - dependent variable	
Constant	-1559717,961*
	Regression coefficients
Income from the sale of products and the provision of services	0,455*
Debt on obligations	-0,085*
* p<0,1; ** p<0,05; *** p<0,01	

Source: compiled and calculated by authors

The multiple correlation coefficients indicate a close relationship between the resulting trait and two factorial traits at the same time, and the corrected determination coefficient indicates that 66.4% of the variation in the dependent variable is explained by the resulting regression. The equation as a whole, as well as its individual parameters, is statistically significant and reliable with a 90% probability. The resulting multiple linear regression equation allows us to draw the following conclusions for manufacturing enterprises:
1) with an increase in income from the sale of products and the provision of services by 1 million tenge, profit before tax increases on average by 0.455 million tenge;
2) with an increase in debt on liabilities by 1 million tenge, profit before tax decreases by an average of 0.085 million tenge.

Thus, a comparison of the two industries under consideration showed a significant difference between the formations of pre-tax profit by increasing income. So, with an increase in income by 1 million tenge, profit in the mining industry and quarrying increases by an average of 810 thousand tenge, while in the manufacturing industry by only 455 thousand tenge. This may indicate more efficient cost management in the mining and quarrying industries compared to the manufacturing industry.

Trade and other receivables from related parties represent primarily amounts related to export sales. Trade receivables from manufacturing enterprises amounted to 2,184 billion tenge in 2017 and 2,249.6 billion tenge in 2018, with an increase of almost 2 times. In the mining and quarrying industries, there is also an increase of 6.6% or for 91bn. tenge. The size of the companies' liabilities also doubled in 2018 compared to 2013, reaching the level in the mining industry of 9,375.1 billion tenge and processing 8,455.6 billion tenge. Based on the analysis of the

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

financial results of the studied company, its business and market activity, it follows that the main attention of the financial management of the company should be paid to increasing the operating and net profit of the company, and due to this, the indicators of the company's profitability.

The main growth factors for these indicators are:
- increase in production, decrease in production;
- operating costs of the company;
- management of the turnover of current assets.

The analysis of the financial condition of industrial enterprises allows us to move on to the next stage of monitoring the financial condition of the company, forecasting the main parameters of the company. When forecasting, long-term plans for the development of the company are developed and indicators are calculated, on the basis of which it is possible to assess the financial condition of the company or individual aspects of its financial and economic activities. The starting point for developing a long-term plan of income and expenses is the forecast of volume sales in kind and in value terms. The main tool for any forecast is the extrapolation scheme. The essence of extrapolation is to study the stable trends in the development of the forecast object that have developed in the past and the present and carry them over to the future. Extrapolation methods are the most widespread and well-developed. The basis of extrapolation forecasting methods is the study of time series. A time series is a set of observations obtained sequentially in time. Let us illustrate the use of this method by the example of forecasting the profitability and the indicator of the volume of industrial production in the Republic of Kazakhstan. To carry out the calculations, we will use the time series data for the period 2013-2018, presented in Table 6.

Table 6. Forecast of the volume of production and profitability of industrial enterprises,%

period number	Years	Forecast of the volume of industrial production, in million tenge	Forecast of the volume of investments in fixed assets of the industry, in million tenge	Profitability forecast, in %	Forecast of the amount of profit (loss) before tax, in million tenge
x		f(x)	f(x)	f(x)	f(x)
1	2013	17 833 994	3 069 814	19,3	5 104 019
2	2014	18 529 225	3 508 871	17	5 100 655
3	2015	14 931 378	3 863 090	-10	-1 856 075
4	2016	19 026 781	4 320 396	18	5 931 748
5	2017	22 790 209	4 769 589	24,3	3 190 133
6	2018	21 745 313,200	5 169 674,500	23,0	8819060
7	2019 forecast	22 786 311,800	5 590 782,000	22,053	9730672
8	2020 forecast	24 517 269,760	6 014 917,233	28,769	10 396 086,401
9	2021 forecast	26 782 526,000	6 451 779,422	38,184	13 863 921,288
10	2022 forecast	27 441 492,381	6 867 590,624	37,122	14 874 303,865
11	2023 forecast	28 353 755,017	7 286 767,942	40,543	17 567 781,351

Source: compiled and calculated by authors

We will smooth the time series using one of the main methods of regression analysis - the least squares method. As a result, we obtain a linear trend dependence of the form (Figure 4, 5, 6):

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810
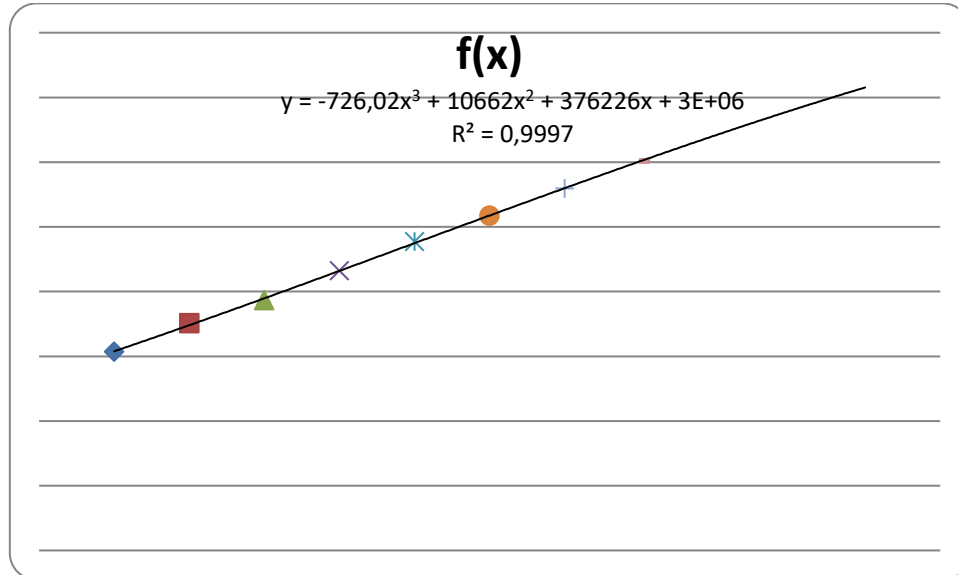
Figure 4. Forecast of the volume of investments in fixed assets of the industry, million tenge
Source: compiled and calculated by authors
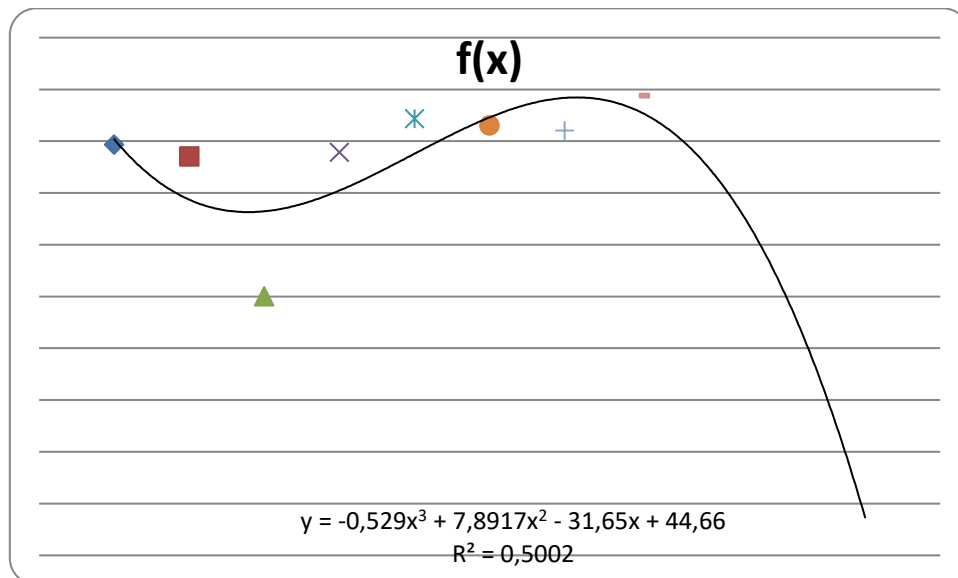
Figure 5. Forecast of profitability, in %
Source: compiled and calculated by authors

The forecast data show that the profitability of the industry by 2023 will grow to 40.5%. The growth will occur mainly due to the extensive factor - the growth in the volume of investments in fixed assets of the industry, which over the same period will grow almost 2.5 times.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810
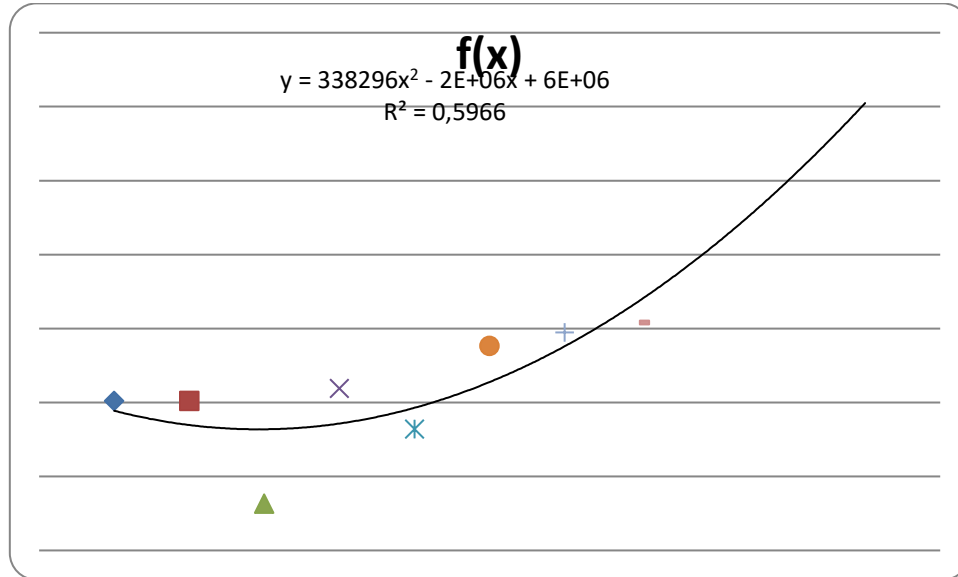
Figure 6. Forecast of the amount of profit (loss) before tax, million tenge
Source: compiled and calculated by authors

For a more complete diagnosis, timely identification of crisis situations in the economy, external state monitoring of the financial condition of enterprises is required (Savitskaya, 2013). At present, the state exercises only control over the bankruptcy procedure of insolvent enterprises (Govorova, 2016).

In modern conditions, the problem of financial insolvency of enterprises is very relevant, therefore, it is necessary to introduce assessment systems for these enterprises, which could serve as indicators of the success of their activities, reflect the degree of attractiveness for investors, and be an internal incentive for the development of enterprises themselves.

In this connection, the main functions of monitoring the financial condition of the company should be:

- analytical function, which assumes, on the basis of constant monitoring of the object, the analysis of its financial condition, which includes the measurement of real results and their correlation with the set goals, standards, and norms;

- diagnostic, implying the interpretation of the results obtained and allowing an objective assessment of the results of the analysis of the monitoring object;

- function of forecasting, is to develop long-term changes in the financial condition of the company;

- organizational and managerial, involving control over the state of the monitoring object and preparation of recommendations for making corrective and proactive managerial decisions.

In terms of profitability indicators, the most indicative is the ratio of the amount of net profit to own capital, since it shows how effectively the shareholder capital invested in the enterprise is being used. Also the most important is the rate of return on assets (resource productivity), which characterizes the intensity of the use of the company's assets for the production of products.

To monitor the financial condition of strategic enterprises at the state level, the following system of indicators is proposed:

- degree of solvency for current obligations;

- current liquidity ratio;

 - ratio of debt and equity funds;

- ratio of provision with own funds;

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

- ratio of stocks provision with own circulating assets;
- return on assets;
- return on equity.
In order to identify problems in the functioning of systems and the reasons for their occurrence, the need to monitor the financial condition of enterprises is obvious. The analysis carried out and the results obtained showed that the main focus of the financial management of enterprises should be aimed at increasing the operating and net profit of the company.

On the basis of forecasting indicators of production volumes and profitability of industrial enterprises, authors formulated conclusions and recommendations for improving monitoring of the activities of industrial enterprises of the Republic of Kazakhstan, contributing to the creation of conditions for balanced, environmentally-oriented growth, understanding the factors contributing to economic development, with due regard for the problems of sustainability, economic and social well-being.
The obtained results of the study indicate that monitoring the innovative potential of industrial enterprises and their innovative activity is of particular importance for the future development of the industry.

The proposed system of indicators for monitoring the financial condition of strategic companies, should be carried out at the state level, will reduce the risk of insolvency, bankruptcy of these companies, and most importantly, the risk of negative impact of the deterioration in the financial condition of strategic companies on the country's economy as a whole. In this regard, monitoring the financial condition of strategic companies will facilitate the timely detection of signs of significant deviations from normal economic development and, thereby, provide a real opportunity for the government and company management to take measures to prevent crisis situations.

5. Conclusion

When monitoring industrial enterprises, a large number of various economic and financial indicators are analyzed, some of which are available and determine the activities of companies and the industry as a whole. Access to other indicators requires the maximum transparency of enterprise management.
An analysis of the set of indicators used, which are compiled on the basis of a limited set of formal indicators, cannot give a complete picture of the situation of an enterprise. There are also a number of criteria that are difficult or even impossible to capture using quantitative indicators. These informal criteria can significantly affect the assessment of the effectiveness of enterprise management.
At present, the existing monitoring theory does not fully and adequately reflect the features of its development at the present stage, including its role in the process of managing the enterprise's activities. The results of the study, presented in this article, indicate the existence of feedback, information, instrumental and organizational support in the monitoring system. It should also be noted the implementation of its coordinating and integrating functions, which are implemented in the management process. The need to integrate management functions is due to the requirement for their operational adaptation, as well as ensuring the effective functioning of industrial enterprises in modern dynamic conditions.
We would also note that in the context of digital transformation, the way to control the processes at the enterprise is changing. The interaction of IT and business is becoming closer - it is necessary to control technological and business processes at the same time. Universal monitoring systems organize a single point for collecting data of various types from various sources and notify about events that must support:
- multifunctionality - access to monitoring a wide range of parameters;
- integration - support for many protocols and technologies for data collection;

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

- availability;
- reporting - flexible reporting system with different levels of detail;
- notifications — configure the delivery methods for event notifications.

Thus, the monitoring system of industrial enterprises is the interaction of accounting, planning, control, regulation and analysis processes, taking into account the priority areas and development goals of the enterprise, through instrumental, methodological, organizational and information support.

References

Abeldanova, A., Smailova, Z. 2017. Modeling the Functional System of Small Business Development in the Republic of Kazakhstan. Journal of Advanced Research in Law and Economics, 6(28), 1671 - 1678.https://doi.org/10.14505/jarle

Akanova, K. 2015. Economic and mathematical models and methods. Almaty: LEM, 142 p.

Akulov, V., Rudakov, M. 2015. Peculiarities of decision-making by the subject of strategic management. Problems of theory and law of management, 5(12), 547-556.

Babaytsev, A., Kuznetsova, E., Rabinskiy, L., Tushavina, O. 2020. Investigation of permanent strains in nanomodified composites after molding at elevated temperatures. PeriodicoTcheQuimica, 17(34), 1055-1067.https://www.periodico.tchequimica.com

Barikayev, E. 2015. Business risk management in the economic security system. Theoretical aspect: Monograph. Moscow: UNITI, 159 p.

Batkovskiy, M.,Kravchuk, P. 2019. Creating a system of monitoring the activity of innovative-active enterprises. Creative Economy, 13(1), 78-96. https://doi.org/10.18334/ce.13.1.39738.

Berstembayeva, R., Tleuzhanova, D. 2017. Financial Aspects of Integration in the Conditions of Formation of the Eurasian Economic Union. Entrepreneurial Environment in the Current Financial Politics of Kazakhstan. Journal of Advanced Research in Law and Economics, 4(26), 1088 - 1094.https://doi.org/10.14505/jarle

Berdar, M. 2020. Formulation of enterprise marketing strategy in the context of internationalization of markets. Asia Life Sciences, 2(22), 497-510.

Bogatenkov, S., Belevitin, V., Khasanova, M. 2018. Risk Management Based on Model of Competences when Introducing Innovative Information Technology. International Journal of Engineering & Technology, 7(38), 78-81. https://www.researchgate.net/deref/http%3A%2F%2Fwww.sciencepubco.com%2Findex.php%2FIJET

Branichev, V. 2018. Strategic analysis of management. Moscow: UNITI, 57 p.

Chowdhury, P., & Paul Sanjoy, K. (2020). Applications of MCDM methods in research on corporate sustainability: A systematic literature review. Management of Environmental Quality: An International Journal, 31(2), 385-405. https://www.emerald.com/insight/content/doi/10.1108/MEQ-12-2019-0284/full/html

Cuevas-Vargas, H., Parga-Montoya, N., Fernández-Escobedo, R. 2016. Effects of Entrepreneurial Orientation on Business Performance: The Mediating Role of Customer Satisfaction. A Formative–Reflective Model Analysis. Journals Sage, 45(77), 440-458. https://doi.org/10.1177/2158244019859088

Dzhamay, E. 2017. Enterprise Finance: Essence, Composition and Structure. International journal of applied business and economic research, 15(23), 297-304. https://www.researchgate.net/publication/323186409_Enterprise_finance_Essence_composition_and_structure

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Govorova, N. 2016. Competitiveness is the main factor in the development of the modern economy. Problems of theory and practice of management, 4(11), 25–37.

Gruzinov, V., Gribov, V. 2015. Enterprise Economics. Moscow: Finance and Statistics, 584 p.

Grynko, T., Krupskyi, O. 2017. Optimization of the Financial and Budgetary Mechanism for the Functioning of Educational Institutions of Higher Education in the Conditions of Innovative Economy Development in the Russian Federation. Entrepreneurial Environment in the Current Financial Politics of Kazakhstan. Journal of Advanced Research in Law and Economics, 4(26), 1100-1113. https://doi.org/10.14505/jarle

Hilkevics, S., Semakina, V. 2019. The classification and comparison of business ratios analysis methods. Insights into Regional Development 1(1), 48-57. https://doi.org/10.9770/ird.2019.1.1(4)

Jiran, N.S., Gholami, H., Mahmood, S., Saman, M.Z.M., Yusof, N.M., Draskovic, V., Javovic, R. 2019. Application of Activity-Based Costing in Estimating the Costs of Manufacturing Process. Transformations in Business & Economics, Vol. 18, No 2B (47B), 839-860.

Kovalev, V. 2015. Financial management. Theory and practice. Moscow: Prospect, 104 p.

Limp, A., Loureiro Rezende, A., Versian, A. 2018. Customer relationships and interdependences in the internationalization process of the firm. RAUSP Management Journal, 1(53), 1151-1168. https://doi.org/10.1016/j.rauspm.2017.10.001

Neculaesei, A.N., Tatarusanu, M., Anastasiei, B., Dospinescu, N., Bedrule Grigoruta, M.V., Ionescu, A.M. (2019). A Model of the Relationship between Organizational Culture, Social Responsibility and Performance. Transformations in Business & Economics, Vol. 18, No 2A (47A), pp.489-509.

Official site of Eurostat. 2019. www.ec.europa.eu/eurostat

Official site of JSC "National Managing Holding" Baiterek "for 2004-2023. https://baiterek.gov.kz/ru/

Official site of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan. http://www.stat.gov.kz

Official site of the Development Bank of Kazakhstan. 2020. https://kdb.kz/

Polikarpov, K. 2018. Management of enterprises of certain industries in the context of international instability. Bulletin of SPbGAU, 2 (51), 225-230.

Rakhimbaev, A., Mikhel, E. 2016. Corporate finance. Almaty: LEM, 464 p.

Savitskaya, G. 2013. Analysis of the economic activity of the enterprise. Minsk: New knowledge, 688 p.

Shiryaeva, Yu., Pertseva, L., Lapshina, E., Lapshin, E. 2017. Some approaches to assessing the innovative development of an enterprise. Creative Economy, 11 (8), 855-862. https://doi.org/10.18334 / ce.11.8.38207.

Soldatova, M., Lazarenko, L., Stepanova, O. 2015. Monitoring of the activity of industrial enterprises at the present stage. Fundamental research, 2(11), 2432-2435. http://uecs.ru/ekonomika-prirodopolzovaniyz/item/4916-2018-05-16-07-17-01

Tepman, L. 2016. Investment Risk Management. Moscow: UNITI, 215 p.

Tretyakova, T., Alferova, A. 2016. Improving the methodological tools for assessing the sustainable development of industrial enterprises. Economic Analysis: Theory and Practice, 9(17), 86–99. http://www.fin-izdat.ru/journal/analiz/.

Turmanidze, T. 2015. Financial management. Moscow: UNITI, 247 p.

Yemelina, N., Omarova, A. 2018. Modelling of Sustainable Development. Journal of Environmental Management and Tourism, 1(25), 2018: 67-74. https://doi.org/10.14505//jemt.v9.1(25).15

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Zhakisheva, K. 2018. Monitoring the financial status of enterprises in the agricultural sector. Journal of Applied Economic Sciences, 8 (62), 105-113.https://www.kaznu.kz/content/files/pages/folder21021/%D0%A1%D0%BA%D0%BE%D0%BF%D1%83D1%81%202018.pdf

Zhuravlyov, V., Khudyakova, T., Varkova, N., Aliukov, S., Shmidt S. 2019. Improving the Strategic Management of Investment Activities of Industrial Enterprises as a Factor for Sustainable Development in a Crisis. Sustainability. 11 (31), 6667-6678. https://doi.org/10.3390 /su11236667

Ainur KARIPOVA is PhD of L.N. Gumilyov Eurasian National University, Nur-Sultan, Kazakhstan.Research interests: small and medium business, innovations, investments.
ORCID ID: orcid.org/0000-0003-4376-9074

Gulmira KABDULLINA is Doctor of Economic Sciences, Professor of South Ural State University, Russian Federation. Research interests: small and medium business, innovations, investments.
ORCID ID: orcid.org/0000-0002-0215-150

Gizat KENESHEVA is PhD student of Karaganda Economic University of Kazpotrebsoyuz, Karaganda, Kazakhstan. Research interests: small and medium business, innovations, investments.
ORCID ID: orcid.org/0000-0003-2928-8928

Madina TURSUMBAEVA is Doctor of Economic Sciences, Professor of Kazakh University of Economics, Finance and International Trade, Nur-Sultan, Kazakhstan. Research interests: finance, taxes, investments, budget, credit.
ORCID ID: orcid.org/0000-0001-7776-6221

Saltanat KAPYSHEVA - Candidate of Economic Sciences, Associate Professor of Kazakh University of Economics, Finance and International Trade, Nur-Sultan, Kazakhstan. Research interests: small and medium business, innovations, investments.
ORCID ID: orcid.org/0000-0002-0916-4752

Zhanna NURGALIEVA – Candidate of Economic Sciences, Associate Professor of Kazakh University of Economics, Finance and International Trade, Nur-Sultan, Kazakhstan.
Research interests: small and medium business, innovations, investments.
ORCID ID: orcid.org/0000-0003-2652-7989

_____

MEASURING MULTIDIMENSIONAL POVERTY WITHIN THE RESOURCE-BASED APPROACH: A CASE STUDY OF LATGALE REGION, LATVIA

Vladimirs Mensikovs [1], Irena Kokina [2], Vera Komarova [3], Oksana Ruza [4], Alina Danilevica [5]

[1,2,3,4,5] Daugavpils University, Parades Str.1, Daugavpils, LV-5401, Latvia

E-mails: [1]vladimirs.mensikovs@du.lv, [2]irena.kokina@du.lv, [3]vera.komarova@du.lv, [4]oksana.ruza@du.lv, [5]alina.danilevica@du.lv

Abstract. In modern social science, the concept of multidimensional poverty is considered the most progressive approach to measuring poverty in countries of various development levels, including the developed ones. As an indicator of poverty in the EU, the multidimensional index of the risk of poverty and social exclusion (AROPE) is used, which integrates the indicators of income poverty, material deprivation and exclusion from the labour market. The empirical basis for its calculation is the data of the survey "Statistics of income and living conditions in the EU" (EU-SILC), published by the statistical office of the European Union. Within the framework of this article, the authors tried to contribute to the theoretical and methodological basis for studying the issue of multidimensional poverty by measuring and analysing it within the framework of the resource approach using the empirical data collected by the authors in one of the peripheral regions of Latvia - Latgale, which for many years has had the lowest indicators of economic development in the country. The resource-based approach is founded on the following methodological path: resources available for the people and households can be transformed into capital as a result of its activation and capitalization that, in its turn, can give the person socially economic benefit, i.e., a resource becomes a capital. The methodology of this study involves the application of new concepts: the "resource-poor" (few resources) and the "functional-poor" (low capitalization of available resources), as well as the "resource-functional poor", who, according to the authors, represent different target groups for the social policy, since they fundamentally differ in terms of both the causes of poverty and the approaches to supporting these groups.

Keywords: multidimensional poverty; resource-based approach; Latgale region; resource-poor; functional-poor; resource-functional poor

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

1. Introduction

Poverty is a multidimensional concept. A European definition was agreed first by the European Council back in 1975: "People are said to be living in poverty if their income and resources are so inadequate as to preclude them from having a standard of living considered acceptable in the society in which they live. Because of their poverty they may experience multiple disadvantages through unemployment, low income, poor housing, inadequate healthcare and barriers to lifelong learning, culture, sport and recreation. They are often excluded and marginalised from participating in activities (economic, social and cultural) that are the norm for other people and their access to fundamental rights may be restricted" (Eurostat 2013).

For quite a long time, when analysing social stratification in their countries, the researchers of the Baltic states paid great attention to the formation of the middle class, while the poor groups of the population were considered as its possible reserve, which, according to certain criteria, did not reach the role of a reliable stabilizer in conditions of complex societal transformations (Zickute 2013; Menshikov 2016; Taljūnaite, Sviklas 2018; Voronov, Ruza 2018; Swedbank 2018; Neverauskiene 2020; Kaźmierczyk 2018). However, the share of these poor groups turned out to be quite large, and after the global financial crisis in 2008 it made more than 90 percent in Latvia (Menshikov 2016). The largest gap between the candidates for the middle class and poor groups was in terms of money income, but there were also significant differences in such assessed parameters as education level and self-identification with the middle class (Menshikov 2016).

All this makes researchers to study more deeply the indeed numerous groups of poor population and propose new approaches to understanding, measuring and overcoming it. In particular, it became possible to use the concept of multidimensional poverty in the search for solutions to these problems, which has been steadily receiving much attention in scientific publications over the past decades (Betti, Verma 2008; Berenger et al. 2009; Esposito, Chiappero-Martinettix 2010; Alkire, Fang 2019; Yang et al. 2019). An initiative group of scientists from Oxford University studying poverty and human development has developed a deprivation-based Multidimensional Poverty Index (MPI), which is now widely used by international research organisations in their statistical reviews and reports (Alkire 2008, 2015; Kakwani, Silber 2008; Chakravarty et al. 2008; European Commision 2012; Alkire et al. 2017; Betti et al. 2018, OPHI, UNDP 2019, 2020). It was originally developed for India, but the analysis of the scientific literature shows that in recent years it has been calculated for many countries, including the developed ones (Betti et al. 2015; Alkire, Fang 2019; Ciani et al. 2019; Mitra, Brucker 2019). Despite its multifacetedness and topicality, the problem of multidimensional poverty is rather poorly highlighted in the Baltic states.

Within the framework of this article, the authors, firstly, will analyse the existing approaches to measuring multidimensional poverty and their results, and secondly, will try to contribute to the theoretical and methodological basis applied for studying the issues of multidimensional poverty, having measured and analysed it within the framework of the resource-based approach (Tikhonova 2006; Boronenko, Drezgic 2014) with the use of empirical data collected by the authors in one of the peripheral regions of Latvia - Latgale, which for many years has had the lowest economic development indicators in the country.

2. Review of literature and statistics

The authors based their analysis of scientific publications on the study of the dynamics of publishing the articles containing the term "multidimensional poverty" in their titles. The analysis of the frequency of using this term in the titles of publications indexed by the SCOPUS database showed that the interest of researchers in the problem of multidimensional poverty is growing every year, as indicated by an increase in the number of articles related to

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

this topic in the period from 2002 to 2019. During this period, a relative surge in publications related to multidimensional poverty was observed in 2008 (10 publications), having gradually peaked in 2019 (78 publications) after a five-year decline (see Figure 1).
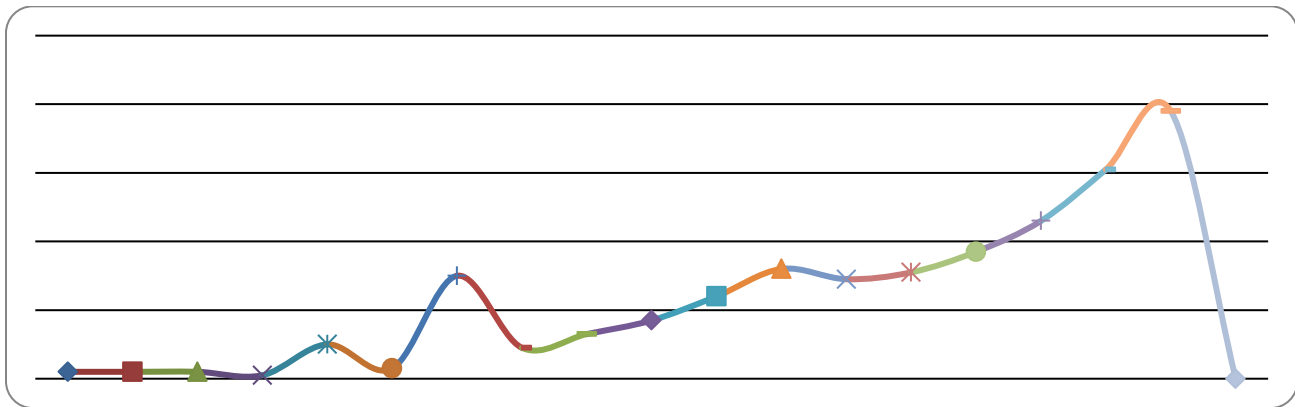

Figure 1. The number of publications related to multidimensional poverty indexed by SCOPUS, 2002-201
Source: compiled by the authors from the data of SCOPUS.

At different times, different authors have written about multidimensional poverty, and judging by the selected scientific publications, there are quite few who have dealt with this problem for at least several years (see Figure 2).
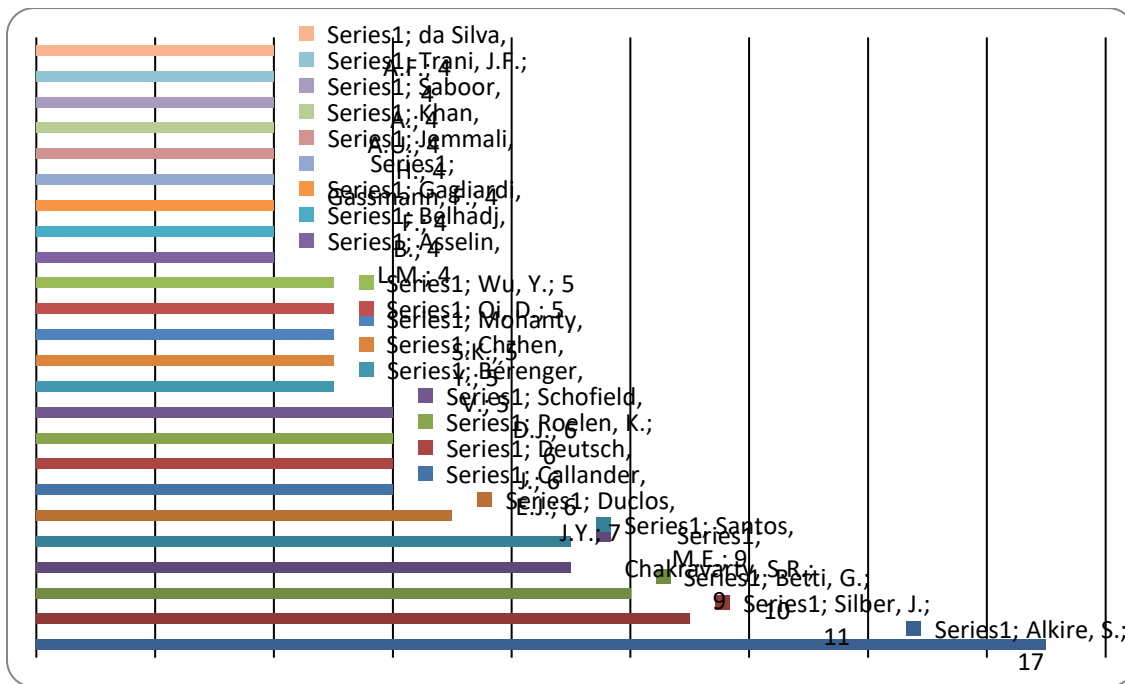
Figure 2. The number of publications related to multidimensional poverty, by authors, 2002-2019
Source: compiled by the authors from the data of SCOPUS.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

One of the first approaches to the study of multidimensional poverty, i.e. the basic-needs strategy, was announced in August 1976 at the International Conference on Employment, organised by the International Labour Organisation (Grant 1977). Within the framework of the concept of basic needs, in addition to material needs that determine the possibility of simple physical survival, services that are necessary for the successful social activity of people are added. Measuring the level of poverty within the framework of this concept is based on the absolute poverty line, however, in addition to expenses on food, the expenses on education, leisure, and healthcare are also taken into account (Streeten et al. 1981).

The concept of basic needs was criticised by the British sociologist P. Townsend. His main argument was that despite the active debate over what to include in the set of necessary means of subsistence, the poverty line calculated on the basis of these data will not make sense, because, according to the scientist: "People will spend money on other things" (Townsend 2010). The main conclusion of P. Townsend was the formulation of the concept of poverty as a relative deprivation: people are rich or poor in relation to what share of the resources available to all members of society is available to them (Townsend 2010). To determine the extent of poverty according to this concept, the relative monetary poverty line is used, which makes 40-60% of the median income of the population of the surveyed country.

Commenting on the works of P. Townsend, A. Sen writes that although, according to P. Townsend, there is no concept of "absolute needs", and the needs of people for material goods in different societies are different, this is true only for material goods. However, the very essence of people's needs is absolute, the thing is that in different societies these needs are satisfied with the help of a different set of goods, since different societies have different capabilities. According to A. Sen, absoluteness always lies at the basis of any relativity (Sen 1983).

S. Alkire (Oxford Poverty & Human Development Initiative, OPHI) and J. Foster (The George Washington University) have made a great contribution to the development of conceptual problems and methods for measuring multidimensional poverty. The method they have developed for measuring multidimensional poverty is called the Alkire-Foster method. This method makes it possible to determine by what parameters a certain share of the population can be considered the poor, as well as to aggregate information to reflect poverty in society (by geographic region, ethnic and other characteristics of social groups). The indicators constructed using this method allow us to identify the interconnection between the types of deprivation and can be used in the development of social policy priorities (Foster et al. 1984; Alkire, Foster 2007; Alkire 2008, 2015; Alkire et al. 2017; Samuel et al. 2018; Alkire, Fang 2019).

A great contribution to the study of multidimensional poverty was also made by the scientific publications of J. Silber with his associates. Their articles dwell upon the study of the main challenges faced in applying a multidimensional approach to poverty and provide an overview of solutions that have not yet been proposed to address these challenges. J. Silber and his co-authors consider the main ordinal approaches to measuring multidimensional poverty (Chakravarty et al. 2008; Kakwani, Silber 2008).

In turn, G. Betii's research provides a step-by-step report on how the instruments for measuring non-monetary deprivation as well as monetary poverty can be built at the regional level. The publications by G. Betii and his colleagues present a practical methodology for estimating variance for multidimensional indicators of poverty and deprivation of households and individuals, obtained from sample surveys with complex designs and rather large-size sampling (Betti et al. 2015; Betti et al. 2018; Ciani et al. 2019)

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Multidimensional poverty embraces aspects of human life that cannot be measured using value indicators: health, education, living conditions, personal security, enforcement of rights and opportunities, etc. A household may have an average income, though lack drinking water, lack access to quality health and education services, have no decent work, live in a region with a high crime rate and / or an environmentally unfavourable region. In this case, the person experiences deprivation - "a situation in which you do not have things or conditions that are usually considered necessary for a pleasant life" (Cambridge English Dictionary 2020).

The use of multidimensional poverty indicators in official statistics is a fairly new progressive practice. The concept of multidimensional poverty has replaced the income poverty criteria, which have been used for a long time as indicators of the socio-economic situation of citizens by the official statistical bodies of various countries, international organisations and individual researchers. Currently, the academic environment has developed an awareness that in modern economically developed societies the concept of poverty cannot be limited only to income criteria. The multidimensional approach to the definition of poverty takes into account not only the lack of financial resources of an individual, but also his limitations in access to education and healthcare, as well as difficulties associated with housing conditions, food, health and other subsistence needs.

Multi-criteria poverty index AROPE[*] used in European official statistics is complex and aggregates information on three poverty criteria. According to the methodology for constructing the AROPE index, persons who have at least one of the following three indicators of poverty are acknowledged to be poor (Eurostat 2020a):

− *Risk of relative income poverty*. The AROPE index uses the concept of relative poverty to determine the risk of income poverty. A person is considered poor if he/she lives in a household where per capita disposable income is below 60% of the median income of the country's population. The per capita disposable income of household members is calculated as follows: the monetary income of all household members, net of taxes and social security contributions, are summed up and divided by the equivalent number of household members. The equivalent number of household members is determined according to the OECD scale. According to this equivalence scale, household members are assigned weights: 1 for the first adult; 0.5 for the second and subsequent adults (aged 14 years and older); 0.3 for each child (aged 0-13).

− *The presence of severe material deprivations*. One is acknowledged as experiencing significant material deprivation if, due to insufficient funds, one cannot afford at least four out of the following nine points:
1) to pay off arrears of housing, utility bills, loans;
2) to have at least one week's holiday away from home annually;
3) meals containing meat, chicken, fish (or vegetarian equivalent) at least every other day;
4) home heating;
5) unexpected expenses;
6) a telephone;
7) a colour TV;
8) a washing machine;
9) a personal car.
After 2015, 4 more points were added making it total of 13 deprivations to be taken into account:
10) to spend a small amount of money on oneself every week;

---

[*] At risk of poverty or social exclusion, abbreviated as AROPE, corresponds to the sum of persons who are either at risk of poverty, or severely materially deprived or living in a household with a very low work intensity (Eurostat 2020a).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

11) to have money for regular leisure / recreation activities;
12) to pay for Internet connection;
13) to get together with friends / family at the table at least once a month.

− *Exclusion from the labour market*. The indicator of exclusion from the labour market reflects low work intensity of working-age people. A person is considered excluded from the labour market in the past year if the ratio of the total number of months worked by all members of his household aged 18 - 59 to the sum of all possible months of work is less than 0.2.

For the empirical calculation of the multi-criteria poverty index AROPE, the database of the EU Statistics of Income and Living Conditions (EU-SILC) is used (Eurostat 2020b). As mentioned above, according to the AROPE methodology, three poverty criteria are determined for each individual, namely, the risk of relative income poverty, the presence of material deprivations and exclusion from the labour market. Thus, a person can be poor according to only one criterion (which is already a sufficient condition for being acknowledged as poor according to AROPE), as well as according to two or three criteria simultaneously.

Figure 3 shows the distribution of the EU population classified as poor according to various criteria of the multi-criteria poverty index AROPE. The greatest contribution to the level of multidimensional poverty is made by the risk of income poverty - 73.8 million people. Meanwhile, for 47.0 million of the poor in terms of income, this risk is the only criterion of poverty, while the remaining 26.8 million, experiencing the risk of income poverty, are simultaneously poor according to one or two other criteria. 26.7 million people in the EU acknowledged to be poor are experiencing severe material deprivation and 28.2 million of the poor are excluded from the labour market. According to the AROPE methodology, the smallest part of the poor are people who are simultaneously experiencing severe material deprivation and are acknowledged to be excluded from the labour market - 1.4 million people. The number of those EU residents who are acknowledged to be poor according to all three criteria of the multi-criteria poverty index AROPE is 5.7 million people.
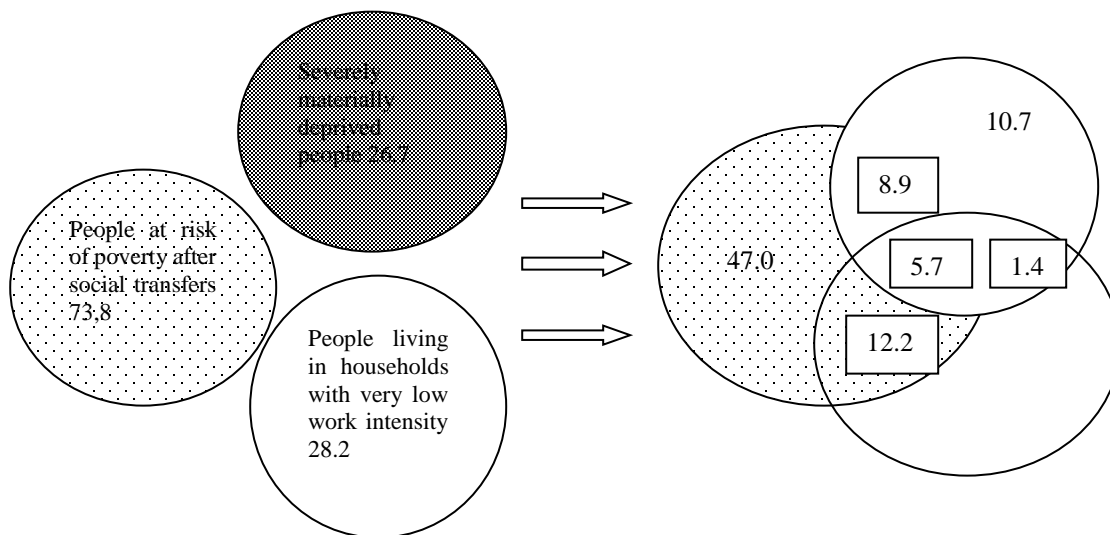
Figure 3. Aggregation of sub-indicators of "People at risk of poverty or social exclusion",
total number for each sub-indicator and combination of sub-indicators (with intersections), million people, EU-27, 2018
Source: compiled by the authors from the data of European Commission 2020.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

In 2018, 94.8 million people, or 21.6% of the EU population (without the UK), were at risk of poverty or social exclusion, a decrease of 12.5 million people, or 3 percentage points, since 2013 (European Commission 2020). The Europe 2020 strategy's goal to "lift at least 20 million people out of the risk of poverty or social exclusion" by 2020 compared with the year 2008 (European Commission 2010 (2020)) is based on the EU's composition at the time the strategy was adopted: including the United Kingdom, but excluding Croatia. In 2018, there were 108.9 million people in the EU (with the UK, but without HR) at risk of poverty or social exclusion, which is a decrease of 7.2 million people compared with 2008. It is worth noting that the EU's at-risk-of-poverty-or-social-exclusion rate increased between 2009 and 2012 because of the delayed social effects of the economic crisis, but it has been in decline since that period. However, with 12.8 million people still needing to be lifted out of the situation of being at risk of poverty or social inclusion, the EU is likely to miss its 2020 target (European Commission 2020).

In Latvia, the AROPE index has been used to measure multidimensional poverty since 2005, as part of the process of modernization of the social statistics of the European Statistical System (including the EU-SILC survey) (Central Statistical Bureau of Latvia 2018). As V. Veretjanovs, the Senior Expert of Social Statistics Methodology Section of Social Statistics Department of the Central Statistical Bureau of Latvia (EU-SILC survey manager) stated, EU-SILC is based on the idea of a "common framework" in contrast with the concept of a "common survey" (Central Statistical Bureau of Latvia 2018). Some of the results of applying AROPE to measure poverty in Latvia for different age groups of the population are presented in Table 1.

Table 1. At-risk-of-poverty rate* in Latvia, % of total population, 2004-2016

Age/ year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Latvia, total	19.4	23.5	21.2	25.9	26.4	20.9	19.0	19.2	19.4	21.2	22.5	21.8	22.1
0-17	22.0	25.9	19.8	23.6	26.3	26.3	24.7	24.4	23.4	24.3	23.2	18.6	18.4
18-24	16.2	19.2	15.0	16.2	19.4	21.0	22.3	20.1	19.8	16.9	22.1	17.3	16.1
25-49	17.3	18.8	15.7	17.3	19.1	19.9	19.3	18.7	17.4	17.4	16.0	14.5	14.6
50-64	21.2	26.3	23.5	25.4	23.9	21.0	20.9	20.1	20.8	20.5	21.5	23.1	22.7
65+	21.1	30.4	35.6	52.0	47.6	17.2	9.1	13.9	17.6	27.6	34.6	38.1	39.9

Source: Central Statistical Bureau of Latvia 2018.

* At-risk-of-poverty rate is the monetary part of AROPE – the share of persons with an equivalised disposable income below 60% of the national median equivalised disposable income.

As concerns material deprivations, the most common type of deprivation in general in the EU is the inability to cope with unexpected financial expenses. This deprivation was experienced by 32.5% of the population of the European Union in 2018 (Eurostat 2020c). Having analysed the data for the Baltic states, it can be noted that this deprivation was experienced most in Latvia - 55.3% of the population, in Lithuania - 48.8%, in Estonia - 34.7%. This means that half of the people in Latvia and Lithuania cannot afford unexpected expenses. Another common type of deprivation is an annual week's holiday away from home. In the EU, 28.5% of the population is deprived of this opportunity, in the Baltic countries: 40.7% in Lithuania, 32.8% in Latvia, and 26.9% in Estonia. Every seventh EU resident (8.9%) has mortgage or rent arrears, utility bills or instalment purchases, 7.3% cannot provide sufficient heating for their homes, the same number is unable to make ends meet, 7% cannot allow themselves meals with meat, chicken, fish (or the vegetarian equivalent) every other day. Having compared the Baltic countries, it can be noted that the percentage of the population experiencing all kinds of deprivation in Latvia is higher than in

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Lithuania and Estonia. Only the percentage of deprivation of heating in Lithuania is almost 4 times higher than in Latvia, and 14 times higher than in Estonia (Eurostat 2020c).
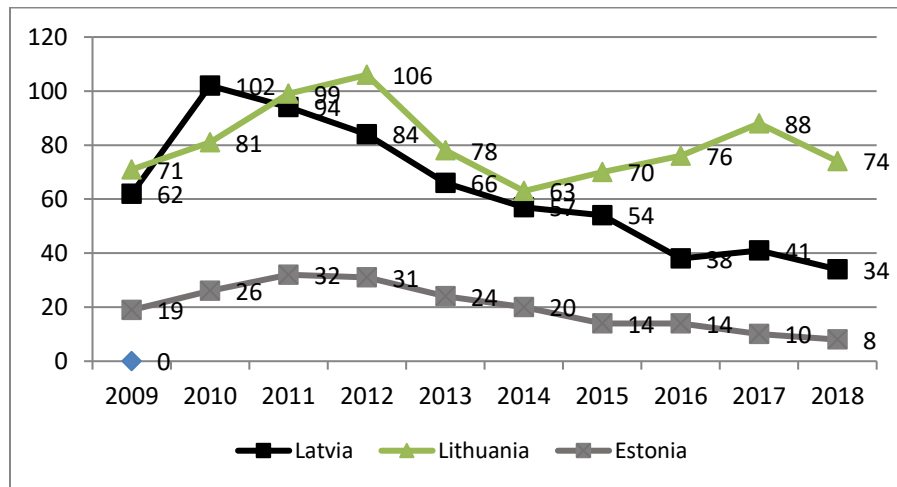
Figure 4 shows the distribution of the Baltic states population acknowledged to be poor according to all three criteria of the multi-criteria poverty index AROPE: in 2018, there were 74 thousand such people in Lithuania, 34 thousand in Latvia, and 8 thousand in Estonia.

Figure 4. Baltic states population acknowledged to be poor according to all three criteria of the multi-criteria poverty index AROPE, thousand people, 2009-2018
Source: compiled by the authors from the data of Eurostat 2020c.

Thus, in Latvia and Lithuania, the level of multidimensional poverty is the highest among the Baltic states and therefore deserves special attention of researchers. As already noted in the Introduction, for the purpose of methodological testing the authors of this article will consider the case of only one peripheral region of Latvia, the poorest one during many years.

As the authors' analysis of European statistics has shown, two sub-groups of the poor population - "poor in terms of income" and "poor in terms of deprivation" - overlap less and less over time, although the situation of each of them remains rather difficult. For this reason, the use of only one of the two basic theoretical and methodological concepts for the analysis and understanding of poverty as the main one seems impossible, since it leads to the loss of a significant part of the poor population as the subject of analysis.

3. Research methodology

As the experts of the European Anti-Poverty Network (EAPN) state, the overall persistent high level of poverty in the EU suggest that poverty is primarily the consequence of the way society is organised and resources are allocated, whether these are financial or other resources such as access to housing, health and social services, education and other economic, social and cultural services (EAPN 2020). In this statement, the authors find support for their attempt to contribute to the theoretical and methodological basis for studying the problem of multidimensional poverty, measuring and analysing it within the resource approach (Tikhonova 2006), which is based on the following methodological path: resources available for the people and households can be transformed into capital

as a result of its activation and capitalisation that, in its turn, can give the person socially economic benefit, i.e., a resource becomes a capital. The application of the resource approach can be found in studies of different social sciences, sometimes revealing innovative resources or innovative forms of its activation and capitalization. One of the co-author of this article used the resource approach in her previous study, proving that economic determinants of the territory competitiveness and development sustainability is, firstly, resources availability at the territory, and, secondly, ability of the territorial agents to transform them into territory capital (Boronenko, Drezgic 2014). So, those resources which are available at the territory, but have not been transformed into territory capital, are not able to determine also competitiveness and development sustainability of this territory. V. Boronenko and S. Drezgic assume that weak development of social technologies for activation and capitalization of resources is the most important reason for hindering the competitiveness and development sustainability of Latvia's regions (Boronenko, Drezgic 2014).

In this study, the authors will try to apply a resource-based approach to measuring poverty of residents, rather than territory competitiveness and development sustainability, as it was in the above-mentioned study, using the empirical data collected by the authors in one of the peripheral regions of Latvia - Latgale.

The methodology of this study assumes the use of new concepts: "resource-poor" and "functional-poor", as well as "resource-functional poor". The first group, according to the logic of the resource-based approach, may include those people who have insufficient resources as such, whereas the second (most interesting for analysis) group includes people whose cause of poverty is not the lack of resources as such, but rather a low level of their capitalization. In turn, the third group of the poor - the "resource-functional poor" - may include those people whose lack of resources as such is accompanied by a low level of their capitalization. In theory, it is the latter type of the poor that is the most difficult target group of the social policy, most in need of support.

To measure the multidimensional poverty of residents of Latgale region of Latvia within the framework of the resource-based approach, the authors used the methodological approach to resource classification proposed by one of the authors of this article (Menshikov 2008, 2011; Meņšikovs 2009; Men'shikov, Vanags 2011), and developed a scale-questionnaire presented in Table 2.

Table 2. A scale-questionnaire for measuring poverty of the population, including questions: Which of the resources indicated in the table do you or your family possess?
Does the presence of a certain resource provide you with anything in particular?

Resources for measuring poverty	I or someone from my family possess it	It brings me monetary income and / or social position and / or moral satisfaction
Economic resources		
Immovable or movable property	1	2
Monetary savings	1	2
Income: private business, salary, dividends, rental income, social benefits, royalties, etc.	1	2
Cultural resources		
Wide knowledge	1	2
High level of intelligence	1	2
Foreign language skills	1	2
Human resources		
Higher education	1	2
Profession	1	2
High level of professionalism	1	2

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Social resources		
Favourable family environment	1	2
Connections with influential people	1	2
A lot of friends	1	2
Administrative resources		
Leadership skills	1	2
Responsible position (for example, at an enterprise, in a state institution, etc.)	1	2
Work experience in the state institutions, local governments or in the management of private enterprises	1	2
Political resources		
Participation in the activities of public organisations (for example, a political party)	1	2
Latvian citizenship	1	2
Status of a deputy, a politician	1	2
Symbolic resources		
Good reputation at the place of work or in the educational institution	1	2
Ability to come up with new ideas and engage others	1	2
Popularity in your city (village, region, state)	1	2
Physical resources		
Good health	1	2
Ability to overcome stress and psychological problems	1	2
Beauty, attractive appearance	1	2
Geographical resources		
Good place of residence (well-kept town or village with good infrastructure - shops, transport, sports and entertainment facilities, school, etc.)	1	2
Good demographic situation in the place of residence (many married couples, many children and newborns, etc.)	1	2
Wide access to information in the place of residence (Internet, newspapers and magazines, social events, etc.)	1	2

Source: compiled by the authors from the data of Menshikov 2008, 2011; Meņšikovs 2009; Men'shikov, Vanags 2011.

Based on the logic of multidimensionality and multi-criteria used by all approaches and tools for measuring poverty analysed in the previous part of the article, the authors have developed the following criteria for assigning respondents to one or another group of the poor (see Table 3).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

**Table 3.** Empirical interpretation of the "resource-poor" and "functional-poor"
as well as the "resource-functional poor"

Criteria	"Resource-poor"	"Functional-poor"	"Resource-functional poor"
Availability of resources	Respondents who (themselves or their families) possess <17 out of 27, i.e. <60%, resources	Respondents who (themselves or their families) possess> 17 out of 27, i.e. > 60%, resources	Respondents who (themselves or their families) possess <17 out of 27, i.e. <60%, resources
Level of resource capitalization	Respondents with> 60% of their available resources capitalized, i.e. bringing them monetary income and / or social position and / or moral satisfaction	Respondents with <60% of their available resources capitalized, i.e. bringing them monetary income and / or social position and / or moral satisfaction	Respondents with <60% of their available resources capitalized, i.e. bringing them monetary income and / or social position and / or moral satisfaction

Source: compiled by the authors

Thus, according to the empirical interpretation proposed by the authors, the "resource-poor" are those people who have relatively few available resources (less than 60% from the list proposed in Table 2 - by analogy with the principle of relative poverty applied in AROPE (see Table 1)), but the level of their capitalization is relatively high, i.e. > 60% of the resources available to respondents or their families bring them monetary income and / or social position and / or moral satisfaction (see Table 3). In turn, the "functional-poor" are those who have less than <60% of their available resources capitalized, i.e. bringing them monetary income and / or social position and / or moral satisfaction, despite the fact that they have relatively many resources as such, i.e. > 60% of all available resources. One and the same person can be both the "resource" and the "functional" poor (i.e. it is an "overlapping" group of "resource-functional" poverty, similarly to the criteria of the AROPE index), and also belong only to the "resource-poor", if one has relatively few resources as such at their relatively high capitalization, or to the "functional-poor", if the resources available to a person are poorly capitalized (see Table 3). In the result of the empirical analysis the authors will obtain three target groups of the poor: "resource-poor", "functional-poor" and "resource-functional poor," whose poverty has different causes and different essence.

4. Research results and discussion

The basis for the empirical analysis was the data of a representative sociological survey of the population of Latgale region of Latvia, which for many years has had the lowest socio-economic development indicators in Latvia. The survey was conducted in 2017. 798 adult residents of Latgale region were interviewed, the level of education of the respondents and their nationality, as well as the type of settlement (urban or rural) were considered.

The empirical analysis of the data showed that according to the method of poverty measurement proposed by the authors, 560 out of 798 respondents or 70.2% of the adult population of the region can be classified as poor in Latgale region. The distribution of the poor by groups is shown in Figure 5.
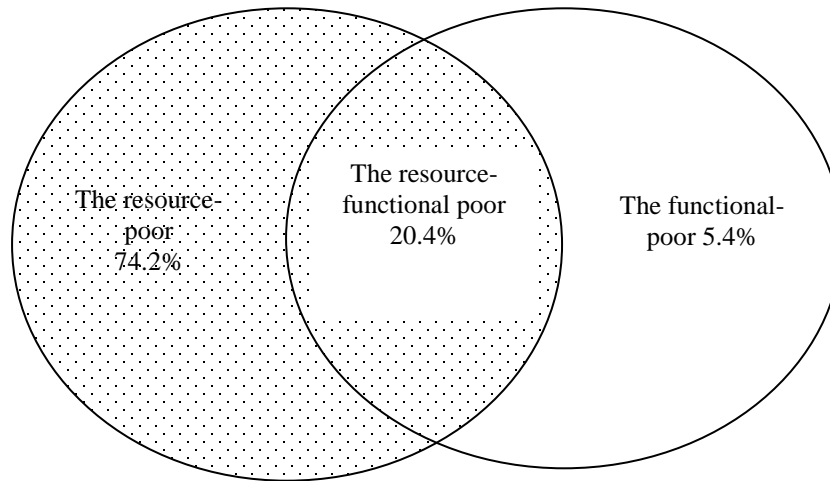
Figure 5. Share of the "resource-poor", "functional-poor" and "resource-functional poor" in the total structure of the poor, n = 560 people (100%), Latgale region of Latvia, 2017

Source: compiled by the authors according to the questionnaire results

As the data presented in Figure 5 show, the main share (74.2%) of the poor population of Latgale region is comprised of the "resource-poor" who have at their disposal less than 60% of the resources presented for the empirical analysis. In turn, the group of the "functional-poor" constitutes a very insignificant part of the respondents acknowledged to be poor - only 5.4%. At the same time, every fifth (20.4%) resident of Latgale region, acknowledged to be poor, suffers from a double burden of poverty - resource (lack of resources) and functional (insufficient capitalization of scarce resources). Interestingly, approximately the same share of EU residents falls into the intersection of any two sub-indicators of the three-dimensional AROPE index (see Figure 3).

Using the correlation analysis, the authors studied the relationship between the amount of resources and the level of their capitalization. The correlation between these two indicators across the entire sampling of respondents turned out to be weak (r = +0.201), though statistically significant (p = 0.000, correlation is significant at the 0.01 level (2-tailed)): the more resources a person has, the higher the specific weight of their capitalization is, and vice versa. This, according to the authors, proves the real existence of the resource convertibility process discovered by P. Burd'e (Burd'e 2001), which was studied earlier on the example of Latvia by one of the co-authors of this article (Menshikov 2008, 2011; Meņšikovs 2009; Меньшиков, Ванагс 2011). Noteworthy results are achieved by a more detailed analysis of the correlative relationship between the amount of resources and the level of their capitalization - by groups of respondents, divided according to the availability of a certain amount of resources: up to 30% of all resources presented for the analysis ("the poorest"), from 30 to 60% of resources ("not the poorest"), more than 60% of the resources ("non-poor") (see Table 4).

Table 4. Correlation between the amount of resources and the level of their capitalization by groups of respondents with different amounts of resources, Pearson's correlation coefficient, n = 798 people, Latgale region of Latvia, 2017

Group of respondents	Correlation between the amount of resources and the level of their capitalization, Pearson's correlation coefficient	The statistical significance of the correlative relationship, p-value
The "poorest" in terms of resources (less than 30% of resources), n = 181 people	+0.060	0.422, the correlation is not statistically significant
"Not the poorest" in terms of resources (from 30 to 60% of resources), n = 349 people	+0.106	0.048, the correlation is significant at the 0.05 level (2-tailed)
"Non-poor" in terms of resources (more than 60% of resources), n = 268 people	+0.079	0.199, the correlation is not statistically significant

Source: compiled by the author according to the questionnaire results

As the results of a more detailed correlation analysis, presented in Table 4 show, a direct positive correlation between the amount of resources and the level of their capitalization is statistically significant only in the group of the so-called "not the poorest", i.e. in the group of those "resource-poor" who possess from 30 to 60% of all resources taken for the analysis, i.e. it is this group where the level of capitalization of resources is most correlated to their quantity: the more resources, the more successfully they are capitalized. In turn, both in the group of "the poorest" and the "non-poor", the amount of resources and the level of their capitalization are not correlated (see Table 4), i.e. it is "the poorest" and "non-poor" who are least able to extract monetary income and / or social position and / or moral satisfaction from their resources, i.e. capitalize them.

5. Conclusions

Having analysed the existing approaches to measuring multidimensional poverty and their results, the authors came to the conclusion that at present, the indicators of economic poverty and inequality, calculated by the Gini index, a poverty line of 1.9 USD per day, the division into poverty and extreme poverty are no longer sufficient. The empirical studies show that a decent standard of living implies that a person has access to quality education, healthcare and basic needs. By focusing on these dimensions of poverty, governments can tackle the root cause of poverty, rather than its consequences. In turn, the use of a multi-criteria index, for example, AROPE, helps to understand the component structure of poverty of vulnerable groups, which stimulates the targeting of social policy.

The analysis of the results of measuring multidimensional poverty has shown that the incidence of poverty in the EU is quite high - virtually every twentieth EU resident is poor according to this method. The level of multidimensional poverty varies greatly across the EU, largely due to differences in the socio-economic development of countries.

The authors of this article propose to measure multidimensional poverty based on the resource-based approach, identifying three typological groups of the poor: "resource-poor", "functional-poor" and "resource-functional poor". The results of the empirical analysis on the example of Latgale region of Latvia showed that the "resource-poor" make up 74.2% of the total poor population of the region, and the "functional-poor" - 5.4%. Every fifth

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

(20.4%) resident of Latgale region, acknowledged to be poor, suffers from a double burden of poverty - resource and functional one.

The authors believe that resource poverty, functional poverty and resource-functional poverty represent different target areas for social policy, since they require conceptually different approaches and solutions. For example, for a group of the "resource-functional poor" it is necessary not only (if in general) to obtain resources as such, but to teach people the skills and social technologies of capitalizing their resources. Whereas the group of the "functional-poor", due to the availability of sufficient resources, generally falls out of sight of traditional social policy and, according to the authors, is a latent form of poverty, which, if left without attention and support, eventually turns into "resource poverty" most often addressed by the state social support system.

References

Alkire, S. (2008). Choosing dimensions: The capability approach and multidimensional poverty. *The Many Dimensions of Poverty,* 89-119. http://doi.org/10.1057/9780230592407

Alkire, S. (2015). Global multidimensional poverty index. *Pakistan Development Review*, 54(4), 287-299. http://doi.org/10.30541/v54i4i-iipp

Alkire, S., Apablaza, M., Chakravarty, S., Yalonetzky, G. (2017). Measuring chronic multidimensional poverty. *Journal of Policy Modeling,* 39(6), 983-1006. http://doi.org/10.1016/j.jpolmod.2017.05.020

Alkire, S., Fang, Y. (2019). Dynamics of Multidimensional Poverty and Uni-dimensional Income Poverty: An Evidence of Stability Analysis from China. *Social Indicators Research,* 142 (1), 25-64. http://doi.org/10.1007/s11205-018-1895-2

Alkire, S., Foster, J. (2007). *Counting and Multidimensional Poverty Measurement.* OPHI Working Paper No. 7. Oxford: University of Oxford. Retrieved July 9, 2020, from http://www.ophi.org.uk/pubs/OPHI_WP7.pdf

Berenger, V., Villarreal C.C., Celestini, F. (2009). Modelling the distribution of multidimensional poverty scores: Evidence from Mexico. *Estudios Economico,* 24 (1). https://doi.org/10.24201/ee.v24i1.130

Betti, G., Gagliardi, F., Verma, V. (2018). Simplified Jackknife Variance Estimates for Fuzzy Measures of Multidimensional Poverty. *International Statistical Review*, 86(1), 68-86. https://doi.org/10.1111/insr.12219

Betti, G., Gagliardi, F., Lemmi, A., Verma, V. (2015). Comparative measures of multidimensional deprivation in the European Union. *Empirical Economics,* 49(3), 1071-1100. https://doi.org/10.1007/s00181-014-0904-9

Betti G., Verma V. (2008). Fuzzy Measures of the Incidence of Relative Poverty and Deprivation: A Multi-Dimensional Perspective. *Statistical Methods and Applications*, 17(2), 225-250. https://doi.org/10.1007/s10260-007-0062-8

Boronenko, V., Drezgic, S. (2014). Economic determinants of territory competitiveness and development sustainability. *Social Sciences Bulletin,* 19 (2), 44-67. Retrieved July 17, 2020, from https://du.lv/wp-content/uploads/2016/01/SZF_vestnesis_2014_2.pdf

Burd'e, P. (2001). Klinicheskaia sociologiia polia nauki. [Clinic sociology of the science field]. In Socioanaliz P'era Burd'e (pp. 55-57).Moskva: Institut eksperimentalnoi sociologii.

Cambridge English Dictionary. (2020). *Meaning of Deprivation in English.* Retrieved June 20, 2020, from https://dictionary.cambridge.org/dictionary/english/deprivation.

Central Statistical Bureau of Latvia. (2018). Measuring poverty and inequality in Latvia: advantages of harmonizing methodology. *Inter-regional Expert Group Meeting "Placing equality at the centre of Agenda 2030",* Santiago, Chile, June 27-28. Retrieved June 20, 2020, from https://www.cepal.org/sites/default/files/presentations/s7_2.viktorsveretjanovs_measuring_poverty_and_inequality_in_latvia.pdf.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Ciani, M., Gagliardi, F., Riccarelli, S., Betti, G. (2019). Fuzzy measures of multidimensional poverty in the Mediterranean area: A focus on financial dimension. *Multidisciplinary Digital Publishing Institute*, 11(1). https://doi.org/10.3390/su11010143

Chakravarty, S.R., Deutsch, J., Silber, J. (2008). On the Watts Multidimensional Poverty Index and its Decomposition. *World Development,* 36 (6), 1067-1077. https://doi.org/10.1016/j.worlddev.2007.10.003

Esposito L., Chiappero-Martinetti E. (2010). Multidimensional Poverty: Restricted and Unrestricted Hierarchy Among Poverty Dimensions. *Journal of Applied Economics*, 13(2), 181-204. https://doi.org/10.1016/S1514-0326(10)60009-8

EAPN (European Anti-Poverty Network). (2020). *Causes of poverty and inequality.* Retrieved June 30, 2020, from Internet: https://www.eapn.eu/what-is-poverty/causes-of-poverty-and-inequality/

European Commission. (2010-2020). *EUROPE 2020: A Strategy for Smart, Sustainable and Inclusive Growth.* Retrieved June 30, 2020, from https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF.

European Commision. (2012). *Measuring Material Deprivation in the EU: Indicators for the Whole Population and Child-Specific Indicators*, 269. Luxembourg: Publications Office of the European Union.
Retrieved June 30, 2020, from Internet: https://ec.europa.eu/eurostat/documents/3888793/5853037/KS-RA-12-018-EN.PDF

European Commission. (2020). *Sustainable development in the European Union Monitoring report on progress towards the SDGs in an EU context.* Luxembourg: Publications Office of the European Union. Retrieved July, 2020, from Internet: https://ec.europa.eu/eurostat/documents/3217494/11011074/KS-02-20-202-EN-N.pdf/334a8cfe-636a-bb8a-294a-73a052882f7f.

Eurostat. (2013). The measurement of poverty and social inclusion in the EU: achievements and further improvements. *Seminar "The way forward in poverty measurement",* December 2-4, Geneva, Switzerland. Retrieved July 2, 2020, from Internet: https://www.unece.org/fileadmin/DAM/stats/documents/ece/ces/ge.15/2013/WP_25_Eurostat_D_En.pdf

Eurostat. (2020a). Glossary: At risk of poverty or social exclusion (AROPE). *Statistics Explained.* Retrieved July 3, 2020, from Internet: https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:At_risk_of_poverty_or_social_exclusion_(AROPE).

Eurostat. (2020b). EU statistics on income and living conditions (EU-SILC) methodology - Europe 2020 target on poverty and social exclusion. *Statistics Explained.* Retrieved July 4, 2020, from Internet: https://ec.europa.eu/eurostat/statistics-explained/index.php/EU_statistics_on_income_and_living_conditions_(EU-SILC)_methodology_-_Europe_2020_target_on_poverty_and_social_exclusion.

Eurostat. (2020c). Persons by risk of poverty, material deprivation, work intensity of the household, age and sex of the person – intersections of Europe 2020 poverty target indicators, 2009-2018. *Eurostat online data.* Retrieved July 5, 2020, from Internet: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_pees01&lang=eng.

Foster, J., Greer, J., Thorbecke, J. (1984). A Class of Decomposable Poverty Measures. *Econometric*, 52(3), 761-766. https://doi.org/10.2307/1913475

Grant J. P. (1977). Employment, Growth and Basic Needs: A One-World Problem. *The International "basic-needs strategy" against chronic poverty*. New York: Praeger Publishers

Kakwani, N., Silber, J. (2008). Quantitative approaches to multidimensional poverty measurement. *Quantitative Approaches to Multidimensional Poverty Measurement 21 February*, 1-265. https://doi.org/10.1057/9780230582354

Kaźmierczyk, J. (2018). Is Neoliberalism Alive? Principles and the Washington Con-sensus. *Social, Economic, and Law Research*, 4 (1), 212-225. https://doi.org/10.21684/2411-7897-2018-4-1-212-225

Menshikov V. (2008). Capital in Sociological Aspect: Theoretical Bases of Investigation and Operational Parameters. In Kultura a rynek (pp. 180-186). Lublin: KUL.

Meņšikovs V. 2009. Kopkapitāls un jaunatnes dzīves stratēģijas: socioloģiskais aspekts.[Total capital and youth life strategies: sociological aspect]. *Sociālo zinātņu vēstnesis,* 2(9), 7-37. https://du.lv/wp-content/uploads/2016/01/SZV_2009_2.pdf.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Menshikov V. (2011). Human capital in the structure of total capital of personality: sociological aspect. *Filosofija. Sociologija*, 22(2), 150-161.

Men'shikov V., Vanags E. (2011). Mezhdunarodnaya trudovaya migraciya: poisk metodologicheskih osnovanij empiricheskogoissledovaniya [International Labour Migration: Searching for Methodological Bases of Empirical Research]. *Social Sciences Bulletin*, 13 (2), 45-70.

Menshikov,V. (2016). Experience of research of social classes in Latvia. *Philosophy/Sociology*. Vilnius: Lithuanian Academy of Sciences.

Neverauskiene, L., Danileviciene, I., Tvaronaviciene, M. (2020). Assessment of the factors influencing competitiveness fostering the country's sustainability. *Economic Research-Ekonomska Istraživanja*, 33(1), 1909-1924. https://doi.org/10.1080/1331677X.2020.1763821

Mitra, S., Brucker, D. (2019). Monitoring multidimensional poverty in the United States. *Economics Bulletin, Access Econ*, 39(2), 1272-1293.

OPHI (Oxford Poverty & Human Development Initiative), UNDP (United Nations Development Programme). (2019). Global Multidimensional Poverty Index 2019: Illuminating Inequalities. Retrieved July 15, 2020 from http://hdr.undp.org/sites/default/files/mpi_2019_publication.pdf

OPHI (Oxford Poverty & Human Development Initiative), UNDP (United Nations Development Programme). 2020. Charting pathways out of multidimensional poverty:Achieving the SDGs. Retrieved July 16, 2020 from https://reliefweb.int/sites/reliefweb.int/files/resources/2020_mpi_report_en.pdf.

Samuel, K., Alkire, S., Zavaleta, D., Mills, C.; Hammock, J. (2018). Social isolation and its relationship to multidimensional poverty. *Oxford Development Studie,* 46(1), 83-97. https://doi.org/10.1080/13600818.2017.1311852

Sen A. (1983) Development: which way now? *Economic Journal,* 93 (372), 745-762. Retrieved July 17, 2020 http://darp.lse.ac.uk/PapersDB/Sen_(EJ_83).pdf.

Streeten, P., Burki,.J., Haq, M., Hicks, N., Stewart, F. (1981). *First Things First: Meeting Basic Human Needs in the Developing Countries.* Oxford University Press. Retrieved July 16, 2020 from http://documents1.worldbank.org/curated/en/882331468179936655/pdf/997710english.pdf.

Swedbank. (2018). Middle class in the Baltics. *Macro Research.* Retrieved July 16, 2020 from https://www.swedbank-research.com/english/macro_focus/2018/18-09-01/middle_class_in_the_baltics_macro_focus.pdf.

Taljūnaite, M., Sviklas, E. (2018). Middle Class in the Baltic Countries Since 1991. *Social Sciences Bulletin,* 27 (2), 7-27. Retrieved July 16, 2020 from https://du.lv/wp-content/uploads/2019/01/Taljunaite.pdf.

Tikhonova, N. (2006). Resource approach as a new theoretical paradigm in stratification researches. *Sociological Researches*, 9, 28-41.

Townsend. P. (2010). The Meaning of Poverty. *The British Journal of Sociology*, 1, 85-101. https://doi.org/10.1111/j.1468-4446.2009.01241.x

Voronov, V., Ruza, O. (2018). Youth unemployment in the Latgale region of Latvia: causes and consequences. *Baltic region*, 10 (4), 88-102. https://doi.org/10.5922/2079-8555-2018-4-6

Yang, F., Paudel, K., Zhuang, T., Jiang, Y. (2019). Multidimensional poverty of the ethnic Tibetan farm and Herder households in Gansu province, China. *Cienc. Rural*, 49(8). https://doi.org/10.1590/0103-8478cr20180559

Zickute, I. (2013). Social class structure in the Baltic countries. *Economics and Management,* 18(1), 183-187. https://doi.org/10.5755/j01.em.18.1.4388

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Vladimir MENSHIKOV is Dr.sc.soc., Professor at Daugavpils University. His research interests: sociology of security; regional development; capital theory. He has status of experts of the Latvian Council of Science in the fields of economics and sociology. He is a head of the Centre of Social Research in Daugavpils University, Latvia.
ORCID ID: https://orcid.org/0000-0001-9988-8588

Irēna KOKINA, Prof. Dr. psych., rector of Daugavpils University, Latvia. She has the status of Expert of the Latvian Council of Science in the fields of Psychology and of Economics and Entrepreneurship. Her research interests: sustainable development, issies of psychology and management.
ORCID ID: https://orcid.org/0000-0001-6778-0783

Vera KOMAROVA is Dr.oec., Leading Researcher at the Social Investigations Centre of Institute of Humanities and Social Sciences of Daugavpils University (Latvia). She has status of the external expert of the COST Association (Brussel). Her research interests: industrial clusters, regional economics, sustainable territory development.
ORCID ID: https://orcid.org/0000-0002-9829-622X

Oksana RUZA is Dr.oec., Docent, Researcher at the Social Investigations Centre of Institute of Humanities and Social Sciences of Daugavpils University (Latvia). Her research interests: regional economics, industrial economics, finances.
ORCID ID: https://orcid.org/0000-0002-6194-3841

Alina DANILEVICA is Dr.oec, Researcher at the Institute of Humanities and Social Sciences of Daugavpils University, Latvia. She has the status of Expert of the Latvian Council of Science in the fields of Economics and Entrepreneurship, Sociology and Social Work. She is Expert of Polish National Agency for Academic Exchange and Expert of the Foundation for Polish Science. Her research interests: regional economics, investments, sustainable development, investment climate (entrepreneurial environment).
ORCID ID: https://orcid.org/0000-0002-2749-2725

_____

AN OVERVIEW OF GREEN HRM PRACTICES AMONG SMEs IN SAUDI ARABIA[*]

Shaha Faisal [1], Mohammad Naushad [2]

[1,2] *College of Business Administration, Prince Sattam Bin Abdulaziz University, Al Kharj, Saudi Arabia*

Emails: [1]msfaisalq@gmail.com; [2] meetnaushad@gmail.com

Abstract. Green Human Resource Management (GHRM) has emerged as the driving force for businesses in the 21st century, as it is practiced by many progressive organizations globally. GHRM is considered as a source that is capable of gaining sustainable competitive advantage. For SMEs, it will not only provide impetus to growth but also a path towards sustainability. The current study intends to identify the most relevant aspects of GHRM, considered important by SMEs. Moreover, the study also intends to examine what should be the focal area among SMEs from the perspective of GHRM. The study is significant due to the fact that most SMEs lacks formal and full-fledged HRM department/activities due to financial and size constraints. The current study is grounded on the methodology of a multi-criteria decision-making approach, as without a scientific background and analogy, a sound decision making is not feasible. The current study utilises the Analytical Hierarchy Process (AHP), a multi-criteria decision making tool to support the objectives of the study. The data for the study was collected from the human resource managers/owners of facility management companies, based in Riyadh region of Saudi Arabia. Based on the results derived from analysis, the study establish the analogy that facility management SMEs in Saudi Arabia are least concerned about the "Green HR Acquisition" but moderately concerned about "Green HR orientation, Training and development", and are highly concerned about "Retaining highly competent employees in green HR practices". The implication of the study will be useful for mangers/owner of SMEs, and academicians.

Keywords: Environmental management; sustainability; Environment; SMEs; Green Human Resource Management (GHRM)

---

1. Introduction

Rapid growth after the industrial revolution has caused various environmental problems like climate change, resources depletion, decrease of biodiversity and other challenges to worldwide ecosystem integrity (Sulphey & Safeer, 2017). Destruction of natural resources, resulting from mass production also posed immense challenge to mankind (Opatha & Arulrajah, 2014; Chehabeddine, & Tvaronavičienė, 2020). This imposes a responsibility on global organizations to pursue environment friendly strategies to protect natural environment and follow sustainable business practices to avoid further damage to nature. Similarly, employees and other stake-holders also expect environmentally responsible behavior from corporations (Boiral et al., 2015; Rajnoha et al., 2019; Borimdesouza et al., 2019). It is now being widely recognized and emphasized that for sustainable competitive advantage, environmental management must be included as an integral part of management strategies (Brío et al., 2007). According to Haddock-Millar, et al. (2016) sustainable development of any organization depends on how well environmental functions are aligned with the organizational performance.

Organizational performance along with other factors depends upon the effective and efficient utilization of resources. Human resources, which form the human capital for companies are considered as the source of competitive advantage. An organization could inculcate the environmental aspects in the form of green policies that lays the foundation of organization cultural change process (Arulrajah et al., 2015). The human resources department need to motivate employees in the adaptation of organizational green initiatives (Priya et al., 2014). Emphasis to the green initiatives and value to environmental protection practices forms the concept of Green Human Resource Management (GHRM). GHRM contributes towards the successful strategic implications of environment management practices (Renwick, et al. 2013). Competent human capital along with shared perception of sustainability help in the strategic positioning of the organization (Jabbour et al., 2010, Yong & Yusliza, 2016).

Researchers across the Globe have studied GHRM practices in distinctive contexts and cultures. For example, Jabbour et al. (2010) conducted research on Branzilian manufacturing industries. Longoni et al., (2016) examined influence of GHRM of financial performance of organization in their study of various supply chain managers across different industries in Italy. Gholami et al (2016) et al., studied the impact of GHRM on sustainability of sports center in Malaysia. Masri and Jaaron (2017) tested impact of GHRM practices on environmental performance of Palestinian Manufacturing organizations. Mishra (2017) studied the status of GHRM in Indian manufacturing sector. Gupta (2018) analyzed the performance of different manufacturing organization in Indian context. Chaudhary (2019) studied the GHRM practices implication in Indian automobile Industry. Islam et al., (2019) examined the challenges of GHRM implication in ready-made garments factories in Bangladesh. Raut et al., (2020) identified most significant indicator of GHRM in their study of automotive service sector in India. Yong et al., (2019) conducted review of GHRM research from the period of 2007 to 2019, they also not found any GHRM research conducted in SMEs context globally.

It is highly evident that GHRM has been explored and tested upon by researchers across the globe, industry, contexts and cultures. It is practiced by many corporates in Arab world, Middle East and North Africa (MENA) region. However, Small and Medium Enterprises (SMEs) still remains indifferent by GHRM practices. The current study explores the GHRM practices among SMEs in Saudi Arabia. With the focus group and interview data from SME's owners and managers this study has also priorities the GHRM practices among SMEs.

2. Theoretical background

Gaining and maintaining the sustainable competitive advantage by adhering to the environmental norms has been a major concern for organizations in the current arena (Paille et al., 2014). The term GHRM involves different HRM policies and practices in that manner it can be aligned with environment and sustainability (Renwick et al., 2008, 2013; Mishra 2017; Longoni et al., 2016; Haddock-Millar et al., 2016; Nejati et al., 2017; Pham et al., 2019). According to Jackson et al, (2011) GHRM uses the HRM practices in a way that environmental management development among organization could be achieved in best possible manner. The primary motive of GHRM is to develop employee skills, knowledge and change the behavior to accomplish organizational sustainable goals (Renwick, et al. 2013). GHRM is considered as the culmination of green environmental practices to the basic functional structure of HRM (Arulrajah et al., 2015). The basic HRM functions usually resolves around three major activities namely, human resources' acquisitions, human resources development and retaining the competent employees (Opatha, 2013). Organizations create their human capital by effectively executing these basic functions. Human capital has always been a great source of competitive advantage. With a blend of green organizational practices, the GHRM has emerged as the means to achieve sustainability (Yong et al, 2020). There are various studies available in literature which elaborate these features in details. Table 1 indicates the different dimensions of GHRM which have been used by different authors in their studies.

Table 1. Dimensions of GHRM available in Literature

S.N.	Variables / Factors	Author
1.	Green Human Resource Planning (GHRP)	Liu and Xie (2013), Arulrajah et al., (2015), Siyambalapitiya et al., (2018)
2.	Green Job design and Analysis	Jabbour et al., (2010), Jabbour (2011), Masri and Jaaron (2017), Shah (2019).
3.	Green Recruitment and Selection	Renwick et al., (2008), Jabbour et al., (2010), Jabbour (2011), Mandip (2012), Arulrajah et al., (2015), Gholami et al., (2016), Gureci et al., (2016), Longoni et al.,(2016), Masri and Jaaron (2017), , Nejati et al., (2017), Gupta (2018),Saeed et al.,(2018), Shah (2019), Siyambalapitiya et al., (2018), Tang et al., (2018), Zaid et. al.,(2018), Chuadhary (2019), Islam (2019), Mukherjee et al., (2020)
4.	Green Induction	Mandip (2012), Arulrajah et al., (2015), Al-Romeedy (2019).
5.	Green Training and development	Renwick et al., (2008), Jabbour et al., (2010), Jabbour (2011), Mandip (2012), Arulrajah et al., (2015), Gholami et al., (2016), Gureci et al., (2016), Longoni et al.,(2016), Bangwal et al., (2017), Dumont (2017), Nejati et al., (2017), Masri and Jaaron (2017), Gupta (2018), Siyambalapitiya et al., (2018), Tang et al., (2018), Saeed et al.,(2018), Shah (2019), Islam (2019), Chuadhary (2019), Yu et al., (2020), Mukherjee et al., (2020).
6.	Green Performance Management	Jabbour et al., (2010), Jabbour (2011), Mandip (2012), Gholami et al., (2016),Gureci et al., (2016), Longoni et al.,(2016), Dumont (2017), Masri and Jaaron (2017), Nejati et al. (2017), Gupta (2018), Saeed et al. (2018), Tang et al., (2018), Shah (2019), Islam (2019), Chuadhary (2019), Mukherjee et al., (2020),
7.	Green Pay and Rewards	Renwick et al., (2008), Jabbour et al., (2010), Jabbour (2011), Mandip (2012), Arulrajah et al., (2015), Gholami et al., (2016), Nejati et al., (2017), Dumont (2017), Masri and Jaaron (2017), Saeed et al. (2018),Tang et. al (2018), Siyambalapitiya et al., (2018), Gupta (2018), Islam (2019), Chuadhary (2019), Mukherjee, et al. (2020),
8.	Green Employee Relations	Renwick et al., (2008 & 2013), Arulrajah et al., (2015), Siyambalapitiya et al., (2018), Shah (2019).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

On the basis of existing literature, and for convenience & suitability to the nature of the present study, the dimensions have been reduced to basics GRHM criterion and model. The categorization utilized in the study is confined to three major functions/categories of GHRM namely "Green HR Acquisition", "Green HR orientation, training & development" and "Retaining highly competent employees in green HR practices". The subsequent paragraphs take an exploratory and critical overview of these dimensions.

2.1 Green HR Acquisition

Green Human Resource acquisition includes all activities related to green talent acquisition process. Top management should make effective strategic plan for talent management to improve the performance of organizations (Yusliza et al, 2019). The major activities available in literature which can be categorized under green HR acquisition includes, green human resource planning, green job analysis, green job description, green job specification, green recruitment and green selection.

2.1.1 Green Human Resource Planning (GHRP)
Human Resource Planning (HRP) is the process of deciding in advance number of personnel required to meet the future demand of company as per predetermined objectives of company (Aswathappa, 2008). HRP integrate with organizational planning to ensure the availability of right type of employee in the right numbers (Sayyadain, 2004) GHRP could be the first step towards the GHRM practices implementation. GHRP identifies the appropriate number and type of employees required as per stated green or environmental objectives of the company (Opatha, 2013; Jackson et al., 2011). To meet the corporate environmental management goals organization require special skills of employees for imminent job position. GHRP accomplishes this obligation in a planned manner (Arulrajah et al., 2015). To maintain the balance between supply and demand of employees this planning process should be flexible in accordance with future changing environmental orientations (Siyambalapitiya et al., 2018).

2.1.2 Green Job Analysis
Job analysis is the process which determines job duties, responsibilities and specifies characteristics of an individual for a particular organizational position (Dessler & Tan, 2006). Job analysis generates necessary details for writing Job description and Job specification (Shah, 2019). Green Job Analysis provides the environment related duties and task of a job position and also specifies the technical abilities of a person for performing environment related task. Therefore, it is essential for effective green recruitment that job description and job specification should cover environment related issues, expected roles, duties and other technical requirements appropriately (Renwick et. al, 2013; Shah, 2019).

2.1.3 Green Job description
A green Job description is a written statement about role, task and responsibilities of a green job what an employee is supposed to perform in implication of environmental management (Renwick, et al. 2008, 2013). As mentioned by Shah (2019), an organization has both environmental and societal responsibilities to protect environment that's why companies now a days includes at least one task related to environmental management in job descriptions. Therefore a green job description includes the environmental commitment of employees apart from routine duties. (Jabbour et al., 2010; Gupta, 2018).

2.1.4 Green Job specification
Job description provides details of the job while job specification highlights human traits and required experience to perform a job effectively. Green job specification is the process of mapping the required level of competencies and qualification to perform environment related jobs (Siyambalapitiya et al., 2018; Faisal & Sulphey, 2018). A

green job specification ensure that new employees will be according to the predetermined need of the job and will be fit in environmental strategies of the organization (Phillips, 2007; Stringer, 2009).

2.1.5 Green Recruitment
Green recruitment and selection is the most significant phase of implementing GHRM practices in organization. Many researchers (Renwick et al., 2013; Yusoff & Nejati, 2019; Islam et al, 2019; Saeed et al., 2019) hold the similar view on green recruitment. Arulrajah et al., (2015) argued that proactive companies about the environment develop their own system and policies as they require employees according to their planned framework. These types of companies, first focus on green recruitment, second develop their existing workforce by imparting training and awareness about the environment. For effective green recruitment the job description and job specification should focus on environmental aspects and company's green expectations from future employees (Wehrmeyer, 1996; Mandip, 2012; Renwick et al., 2013). Therefore, recruitment advertisements need to mention clearly the environmental related agenda of the organization (Crosbie & Knight, 1995; Wehrmeyer, 1996). By this way only potentially talented candidates will be attracted towards the organization and will apply for vacant positions (Greening and Turban, 2000). Showcasing organization's environmental accomplishment through own website, different web portals and other public facing channels leads to "employer branding". Furthermore, this amicable behavior with environment gives an edge to organization and fascinate environmental aware applicants (Phillips, 2007; Stringer, 2009; Jackson et al., 2011; Guerci et al., 2016).

2.1.6 Green Selection
In this phase, organization needs to distinguish the green awareness of the applicant and ensure whether the personality of the employees is well aligned with the organization environment related objectives (Tang et al, 2018; Saeed et al., 2019, Shah et al, 2019). According to Arulrajah et al., (2015) the environmental related selection criteria helps organization to select best environment friendly employees in order to meet organization' expectation as per predetermined job description. Therefore to hire most suitable employees the green selection criteria is based on the applicant knowledge, attitude about environment. Organizations need to examine applicant awareness and concern about environment during interview and evaluate them appropriately before the final selection (Crosbie and Knight, 1995; Wehrmeyer, 1996).

2.2. Green HR orientation, Training and development
A proper Orientation and training program amplify newly recruited employee towards organization and retain existing employees as well. Furthermore, it also helps in increasing employee productivity and establish long lasting relationship with organization. The Green HR orientation, Training and development program can be summarised into two elements namely "Green Induction" and "Training and development".

2.2.1 Green Induction
Wehrmeyer (1996) describe that green induction program aim to make new employees aware about the organizational environmental culture in a proper manner. This program can be of two types – first the general induction, and second job specific induction. In the first program employees are given basic knowledge about policies of the organization related to environment. Some organizations arrange job specific induction program for new employees which cover each aspect of a particular job (Arulrajah et al., 2015; Yusliza et al, 2019). Many researchers opined that induction program must ensure that employees are aware of their environmental responsibilities and become familiar with organizational policies, culture as well (Mandip, 2012; Renwick et al, 2013; Al-Romeedy, 2019).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

2.2.2 Green Training and development

Green training enhances skills, knowledge and develop sustainable behavior of employees by providing training about environment sustainability. (Zoogah, 2011; Gupta, 2018). According to North (1997) to change the attitude of the employees, organization should conduct seminar and environmental education workshops. Anthony (1993) states that environment related training needs analysis is the first step towards training the manpower. It ensures the required level of environmental knowledge needed by employees. After identification of training needs organization should design the training program for employees (Tang et al., 2017). According to Jabbour (2011) in order to attain environmental organizational objectives, green training is an effective system that provides more knowledge to employees about different aspects of environmental issues. It gives insight to them to deal with it properly. A green training program should not be for specific department, it should provide equal opportunity to develop skill, knowledge and awareness about environment to all categories of employees (Sammalisto and Brorson 2008). For the future needs of the organization, a well programmed job rotation needs to be implemented that can give more exposure to employees (Renwick et al., 2008).

2.3. Retaining highly competent employees in green HR practices

Human capital is the driving force of an organization, and competent employees play leading role in gaining the competitive advantage over others. Organization needs to take strategic initiatives in their GHRM practices to retain competent and talented workforce (Faisal et al., 2020). Therefore, organizations should provide suitable career development opportunities along with good work environment. By taking a cue from the existing literature, retainment of employees can be confined to three important pillars, namely "Green performance Management", "Green Reward system" and "Green employee relations."

2.3.1 Green performance Management

Green performance management system is key aspect of implementing the GHRM process (Gholami et al., 2016). An organization needs to judge separately the environment related performance of employees, and then the normal performance system to ensure the employees are on predetermined track. Companies usually prefer to have the environment performance standard, Environment Management Information Systems (EMIS) and environment audits to measure the environmental performance (Marcus and Fremeth, 2009; Renwick et al, 2013). According to Milliman and Clair (1996) EMIS should be integrated with the performance measurement system to evaluate the performance of employees rather than using it just as a reporting system. Saeed et al., (2019) discussed the usage of green performance indicator to specify the green criteria (environmental responsibilities, environmental incidents and communication of the green policies) in performance appraisal system.

2.3.2 Green Reward system

Green reward system is an integral part of GHRM system as it motivates employees who performed as per environment standards set by the organization (Jabbour et al., 2008; Ahmad 2015). Similarly, Organizational sustainability is highly dependent on the green reward system (Arulrajah et. al., 2015). This can be adopted in two forms, financial and non-financial. Some organization give financial rewards like monetary incentives, bonus and cash prizes for good environmental performance (Phillips, 2007; Jabbour et al., 2008; Tang et al., 2017). Crosbie and Knight (1995) mentioned that some companies review the salary of employees as a result of good environmental performance. On the other hand some companies give non-monetary rewards in form of awards, prizes, admiration and special recognition. Opatha (2013) mentioned that this type of extrinsic rewards also gives motivation to employees to perform better.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

2.3.3 Green employee Relation

Employee relation refers to cordial relationship between employer and employee. Hormonal employee relations lead to high moral of employees that also increase the productivity, employee participation and employee involvement (Ahmad, 2015, Siyambalapitiya et al., 2018). Arulrajah et al., (2015) suggested that for the maintenance of green industrial relations unionized workforce participation is crucial as they play centralized role in implementation of green initiatives of the organization. Some companies offer a range of benefits like joint consultation and gain sharing with trade union to accomplish environmental objectives. The company should encourage employees to be the part of environment sustainability and their eco-friendly suggestions should be welcomed (Casler et al., 2010). Green employee relations includes actively involving employees in green suggestion schemes, allow them to work with green idea, encourage them to participate in problem solving circle and increase their participation in other green matters. Supervisor also supports employees in environment sustainability related issues (Renwick et al., 2008, 2013).

Thus, in the background of above discussion it could be easily understood that the green initiatives from HRM perspectives might not fetch equal weight from stakeholders, specifically the top management of corporations. Moreover, Small and Medium enterprises (SMEs) are highly susceptible to these practices due to their financial constraints. Overall, GHRM practices and systems are not practiced among SMEs. They tend to focus more on certain area rather considering the entire practices. Medium size companies might adopt the whole GHRM processes, while for small and micro enterprises, it is always difficult to look for entire system to be established. The current study is an endeavor to understand the highly expedient practices among SMEs and rank them in terms of their prioritization. Therefore, the model presented in figure 1 could be proposed for the current study to tackle the intended objectives of current study.
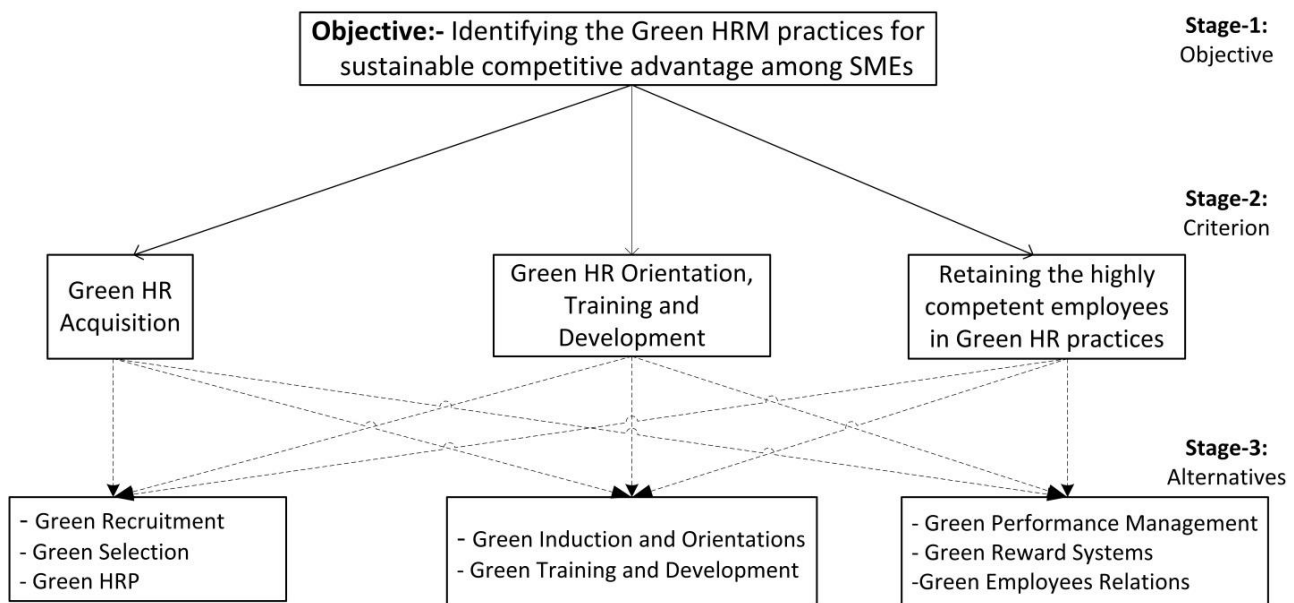
Figure 1. Theoretical Model for Green HRM practices among SMEs

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

From the figure 1 we can easily understood the theoretical framework of our study. Our aim is to identify the green HRM practices instrumental for sustainable competitive advantage. The objective can be further split into criterion for achieving the stated objectives. Each criterion has a series of distinct alternatives. Which form the stage three of our framework? The nature of the model aligns it into a hierarchy which can be understood by figure 1. Since, these criterion and alternatives are multiple, it create an ambiguous decision making scenario. Each criteria or alternative may not be equal in terms of importance to the objective. We need to shortlist the highly appropriate criteria and alternatives based upon their weighted score. A peer wise comparison is also needed to select the most appropriate criteria and alternative. The organic nature of current framework makes it highly appropriate for multi-criteria hierarchy analysis tool. We assume that Analytical Hierarchy Process (AHP) as the highly appropriate tool for problems with such nature.

3. Research objective and methodology

The nature of the problem discussed in the current study suggests that it emerged as a multi-criteria decision. The study intends to know the most relevant aspects of GHRM, being given high importance among SMEs. Moreover, it is intended to know what should be the focal area among SMEs for GHRM perspectives. It attracts the attention because most of SMEs lacks a formal and full-fledged HRM department/activity due to financial and size constraints. Therefore, the current study is grounded on the methodology of a multi-criteria decision-making approach. As without a scientific background and analogy a sound decision making is not feasible.

Therefore, a multi-criteria decision making tool must be considered for the given problem. Analytical Hierarchy process (AHP) is a multi-criterion decision making tool used in complex decision making problems, where criterion are many or ambiguous. AHP is a logical multi-criterion decision making technique based on human psychology and mathematics (Pourshahbi et al., 2018). Traditionally, AHP methodology is considered as a five step process (Naushad & Sulhpey, 2020). The first step of AHP is designed to set the goal. At second step the stated goal is decomposed in multiple criteria. In the next stage these criterion are again broken into multiple alternatives. In forth stage each criterion and alternatives are assigned weight based on their importance. The fifth stage of AHP methodology carried out the pairwise comparison with regard to criterion and alternatives. The final stage combined all judgments and come up with priority weights. The hierarchy thus developed for AHP studies could be seen in figure 1.

Usually, for AHP studies, data is collected either by structured interviews or focus groups with experts/practitioners in the same field. The data for the current study was collected from the HR practitioners in facility management SMEs in Riyadh region of Saudi Arabia. A structured questionnaire based on AHP scale was developed. Satty (1977), the premiere of AHP methodology seemed to develop a special nine point scale different from Likert scale. Before administering the AHP questionnaire, HR managers were oriented about green HRM practices and it's utilities. A focus group with HR managers was also conducted. Data thus collected was analysed by using Expert choice® software.

4. Results and Discussions

While, executing the AHP hierarchy (mentioned in figure 1) results were obtained in two forms of priority weights and pairwise comparison, i.e. (i) priority weights for criterion and (ii) priority weights to alternatives. Priority weights and pairwise comparison was made on a special AHP scale recommended by (Saaty, 2000), i.e. (from 1-9, where 9 is extremely important and 1 is equally important). Figure 2 specifies the importance of criterion selected based on their weighted score and pairwise comparison obtained after analysis. Results indicates that retaining the

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

competent employees in green HR practices had been the vastly important criterion for HR managers among SMEs. Moreover, Green orientation, training and development remains the second important thrust area for HR managers. While, green human resources acquisitions attracted the least importance from HR managers, retaining employees with value to the green HR practice attracted the highest weightage because of one obvious reason that organisations invest their good amount of resources on training and development and maintaining the good human relations. It is supported with the fact that among the facility management SMEs in KSA, "green human resource acquisition" attracted the least weightage. It could be arguably because that majority of workforce in KSA are expatriate workforce. Where employers are left with less choices because of availability and high acquisition cost. Therefore, they focus more on developing the existing/acquired workforce in green and environmentally sustainable practices. Which simply means that facility management SMEs are more interested in developing at their own "the sustainable green human capital". However, it has to be replaced with vice-versa strategy. SMEs are usually characterized with low financial resources. Thus, investing on training and development will add to their fixed costs. Therefore, SMEs in KSA must focus more on acquiring the workforce which are good in green HR practices instead of developing them at their own. They must acquire the employee which are already trained in Green HR practices.
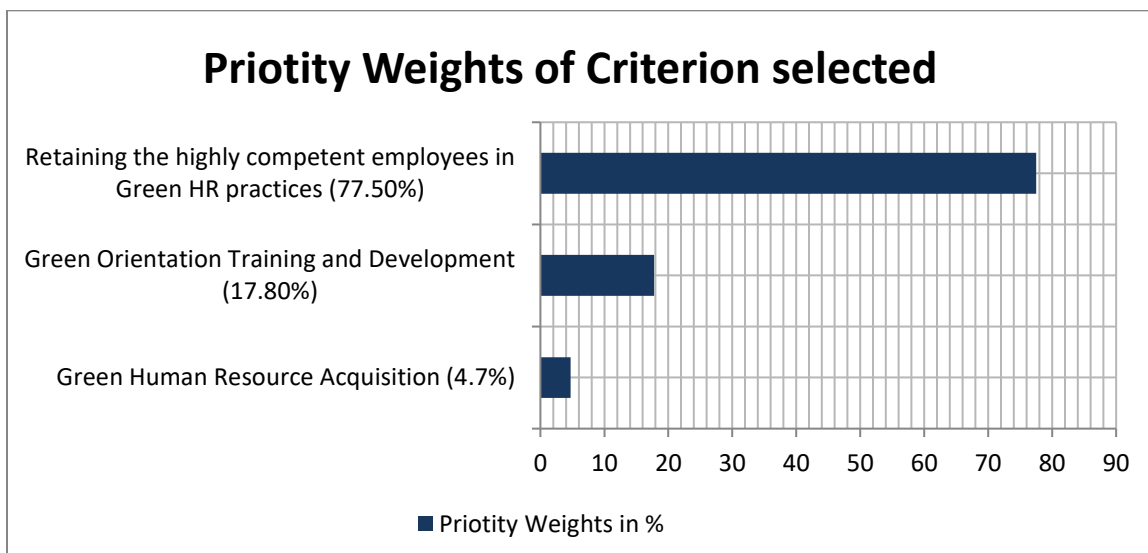
Figure 2. Priority Weight for Criteria of Green HRM practices among SMEs

The results of relative weights for alternatives with respect to goal are presented in Figure 3. Green reward systems contributed highest to the goal with a priority weight of 58.30% (0.53). While, green job analysis contributes the lowest with a minimal weight of 0.20% (0.02) which is less than 1 percent (w<1). Green reward system gains the highest priority weight which indicates that SMEs in KSA generally and facility management companies specifically value the green initiatives and conduct of employees. This is in confirmation of the recommendations of studies like Jabbour et al., (2008); Opatha (2013); Tang et al., (2017) etc. It is supported by earlier studies too that rewarding the good conduct of employees not only motivate them to perform better but also helpful for organisational financial performance and human capital formation. A good amount of human capital ultimately results into a sustainable competitive advantage of organisations (Sulphey & Naushad, 2019; Naushad, 2019). If the top five green HRM practices are identified among the facility management SMEs, it could be summed up as (1) Green reward system with a priority weight of 58.30%, (2) Green performance management with a priority

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

weight of 15.90%, (3) Green Training and development (13.4%), (4) Green employee relations (4.4%) and (5) Green selection (3.5%).
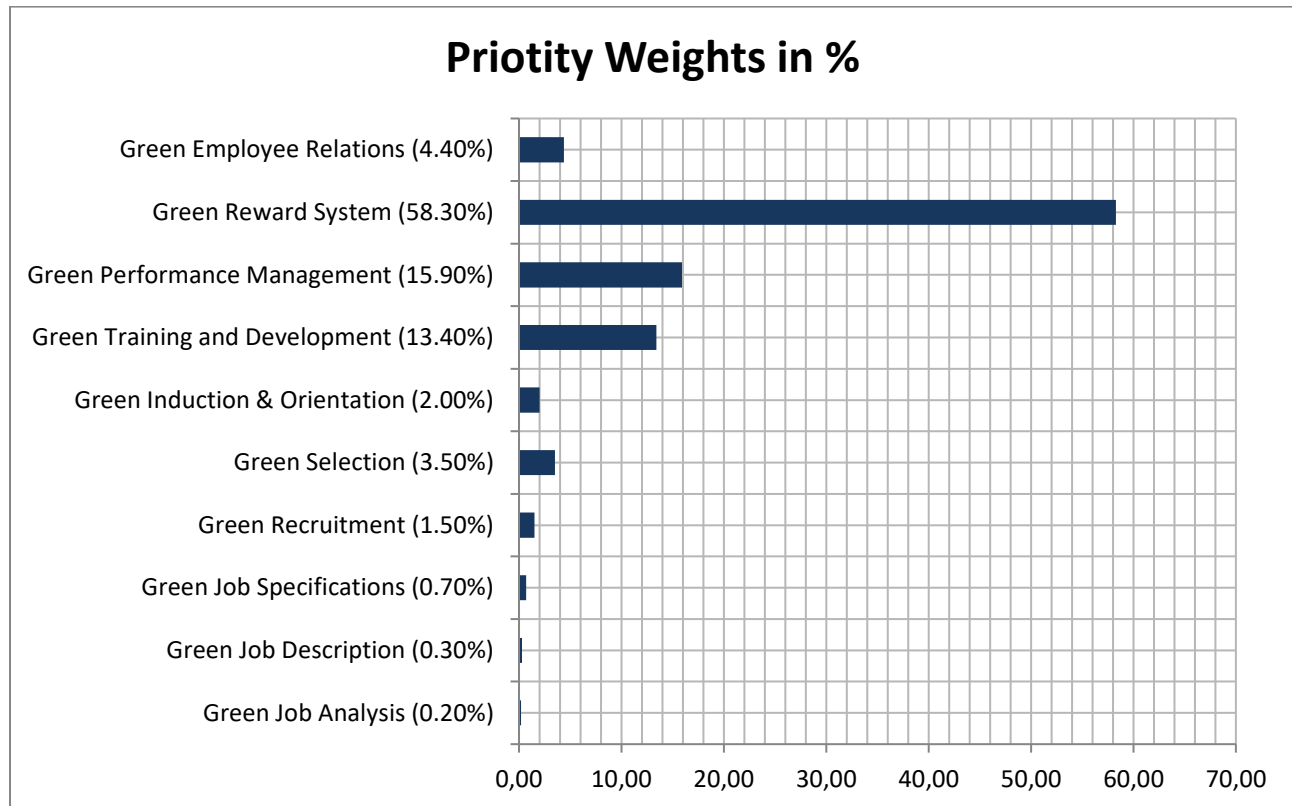
Figure 3. Priority Weight for Alternatives of Green HRM practices among SMEs

The last step of AHP decision making process is to carry out a sensitivity analysis, where the input data are slightly modified in order to observe the impact on the results. If the ranking does not change, the results are said to be robust (Chen & Khan, 2013; Chang at el., 2007). The sensitivity analysis in Expert Choice varies with the weights of the criteria as input data. Sensitivity analysis is a fundamental process in the decision with AHP. Figure 4 (a) & (b) depicts the Performance Sensitivity Analysis (Preliminary).

In order to carry out the sensitivity analysis equal weights were assigned to three criteria selected for the study. Each criterion claimed approximately 33.33 per cent of weights. Figure 4 (a) & (b) presents the results of pre-sensitivity analysis, while figure 5 (a) and (b) provides the results of post sensitivity analysis. Figure 5 shows that changing the weights of criteria alters the priorities of alternatives. However, the top five alternatives were found to essentially remain same.
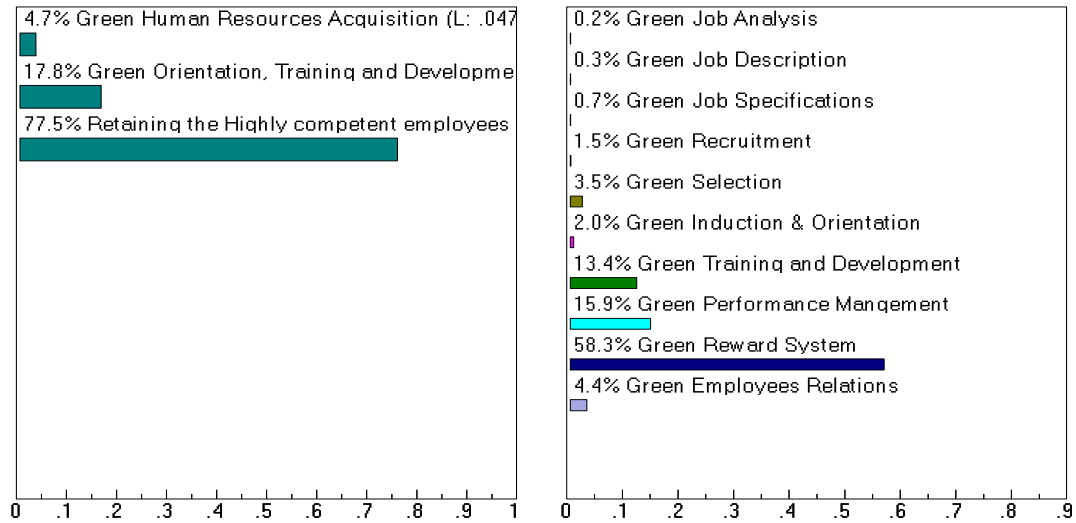
Figure 4(a). Performance Sensitivity Analysis (Preliminary)
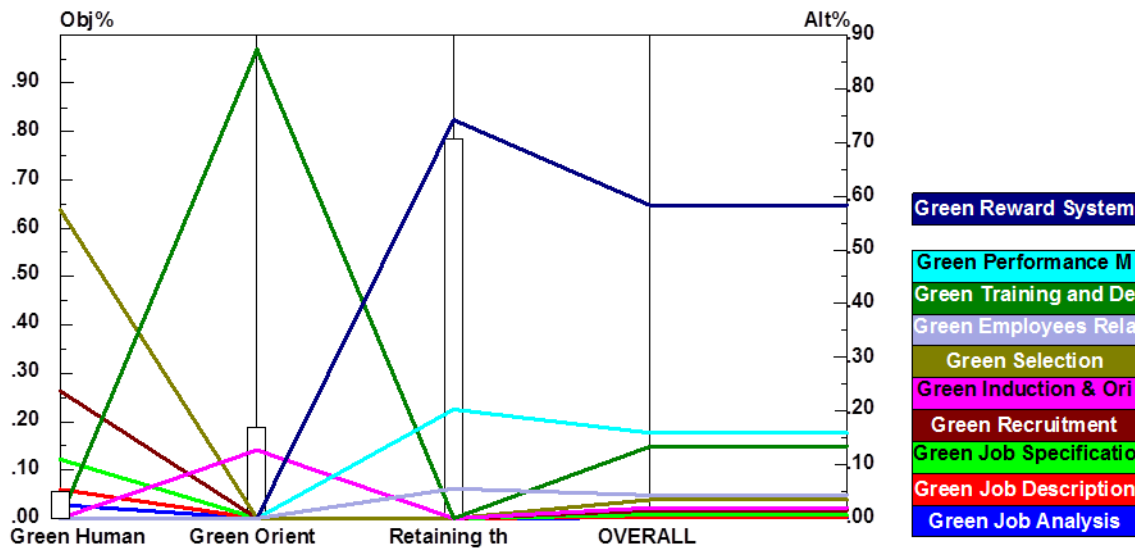
Figure 4(b). Performance Sensitivity Analysis (Preliminary)

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
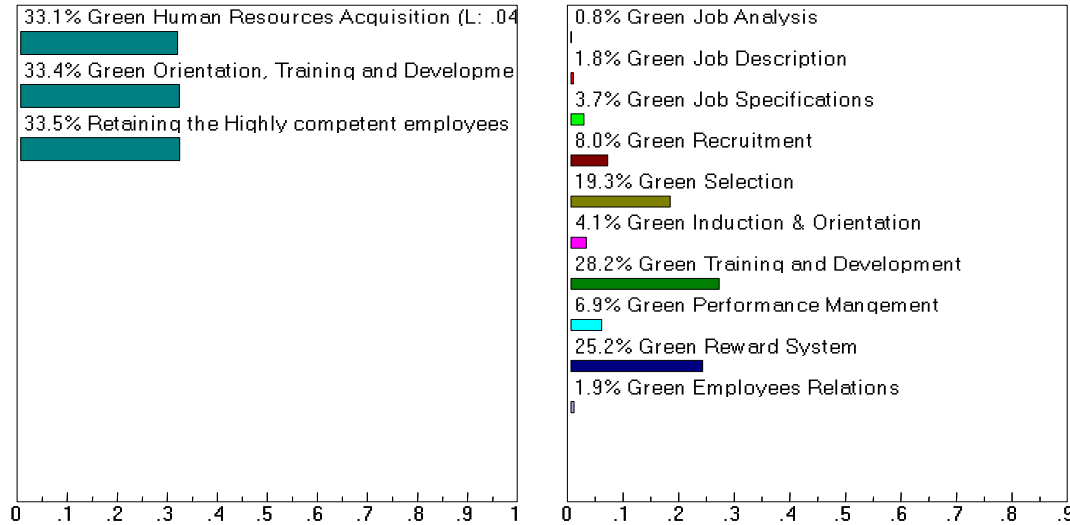
Figure 5 (a). Dynamic Sensitivity Analysis (Preliminary)
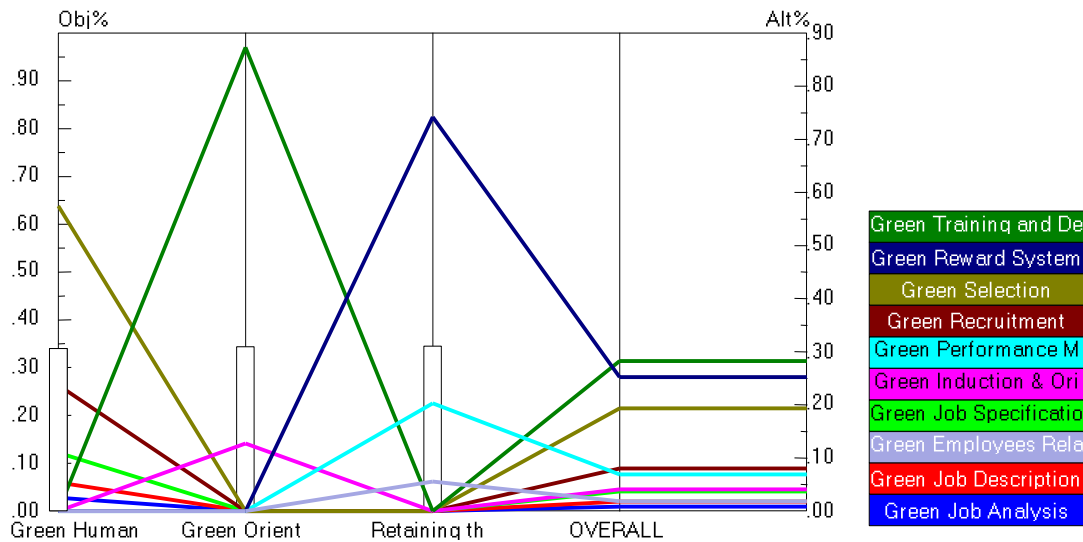
Figure 5 (b). Dynamic Sensitivity Analysis (Preliminary)

This indicates that the results are directed at the same direction with a pattern. This shows that the alternatives that emerged from the analysis are robust enough to moderate changes in the criteria. Therefore, the priorities that emerged from the analyses could be sufficient and relied upon.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

5. Conclusion

This study investigated the high priority factors of green HRM among facility management SMEs in KSA. Based on the results derived from AHP model, this analogy can be established that facility management SMEs in Saudi Arabia are least concerned about the "Green HR Acquisition" but moderately concerned about "Green HR orientation, Training and development", and are highly concerned about "Retaining highly competent employees in green HR practices".

Alternate adopted for the study witnessed the similar trend as "Green Reward system" attained the highest priority rate, followed by Performance Management. Both are considered elements of "Retaining highly competent employees in green HR practices". The results are in alignment of Gholami et al, (2016). This indicates that GHRM is in initial stage in SME sector. There is low recognition and acceptance of GHRP, Recruitment and selection, which are considered elements of "Green HR Acquisition" among SMEs. Most of the organizations are willing to adopt low cost initiatives of protecting environment. Masri and Jaaron (2017) found significant relations of green performance management and appraisal, green reward and compensation on environmental performance of Palestinian Manufacturing organizations. Similarly, Islam et al., (2019) revealed monetary incentives could be one of the effective solutions in implication of GHRM practices in the organizations. Similarly, Yu et al., (2020) suggested training (ability) and incentives (motivation) should be given focus in GHRM practices for better environmental collaboration. Current study also in line with this as it emphasized on "green reward" and also indictive towards importance of training in studied units.

The role of different GHRM Practices is widely acknowledged in the existing literature. Present study provides list of GHRM practices are highly effective and used by different SMEs in Kingdom of Saudi Arabia. Furthermore, present study clearly specifies the most important aspect of GHRM by comparing each practices using AHP tool. Therefore mangers can effectively plan and prioritize environmental related task. It is evident that organizations need to assess employees green behaviour and link it with pay and promotion (Hameed et al., 2020). The implications of the present study are in line with this, as it also suggested retention of effective green performance, and rewarding of the employees. The implication of the study is not only useful for mangers / owners of SMEs, but also for academicians working on GHRM especially for SMEs sector. A limitation of the study is that the results are based on only one sector, i.e. facility management SMEs in Saudi Arabia. This is considered to be a service sector organization. GHRM practices may vary between sectors, industries and national economies. Future research can be conducted on a bigger sample of SMEs by including manufacturing sector within and outside Saudi Arabia.

Refrences:

Ahmad, S. (2015). Green Human Resource Management: Policies and practices, Cogent Business & Management, 2(1), 1030817, https://doi.org/10.1080/23311975.2015.1030817

Al-Romeedy, B. S. (2019). Green human resource management in Egyptian travel agencies: constraints of implementation and requirements for success. Journal of Human Resources in Hospitality & Tourism, 18(4), 529-548.

Anthony, S. (1993). Environmental Training Needs Analysis. Training Officer, 29(9), 273.

Arulrajah, A. A., Opatha, H. H. D. N. P., & Nawaratne, N. N. J. (2015). Green human resource management practices: A review. Sri Lankan Journal of Human Resource Management, 5(1). http://www.tuc.org.uk/economy/tuc-9996-f0.pdf/

Aswathappa, K. (2015). Human resource management: Text and cases. Tata McGrawHill Publishing Company Limited.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Bangwal, D., Tiwari, P., & Chamola, P. (2017). Green HRM, work-life and environment performance. International Journal of Environment, Workplace and Employment, 4(3), 244-268.

Boiral, O., Talbot, D., & Paillé, P. (2015). Leading by example: A model of organizational citizenship behavior for the environment. Business Strategy and the Environment, 24(6), 532-550.

Borimdesouza, R., Zanoni, B. L., Janchiba, J. H., & Borinelli, B. (2019). Organizations and sustainability: a field of knowledge. Management of Environmental Quality: An International Journal, 31(2), 365-384. https://www.emerald.com/insight/content/doi/10.1108/MEQ-09-2019-0203/full/html

del Brío, J. Á., Fernandez, E., & Junquera, B. (2007). Management and employee involvement in achieving an environmental action-based competitive advantage: an empirical study. The International Journal of Human Resource Management, 18(4), 491-522.

Casler, A., Gundlach, M. J., Persons, B., & Zivnuska, S. (2010). Sierra Nevada brewing company's thirty-year journey toward sustainability. People & Strategy, 33(1), 44-51.

Chaudhary, R. (2019). Green human resource management in Indian automobile industry. Journal of Global Responsibility. 10(2), 161-175.

Chang, C. W., Wu, C. R., Lin, C. T., & Chen, H. C. (2007). An application of AHP and sensitivity analysis for selecting the best slicing machine. Computers & Industrial Engineering, 52(2), 296-307.

Chehabeddine, M., & Tvaronavičienė, M. (2020). Securing regional development. Insights into Regional Development, 2(1), 430-442. http://doi.org/10.9770/IRD.2020.2.1(3)

Chen, Y., Yu, J., & Khan, S. (2013). The spatial framework for weight sensitivity analysis in AHP-based multi-criteria decision making. Environmental modelling & software, 48, 129-140.

Crosbie, L. & Knight, K. (1995). Strategy for Sustainable Business: Environmental Opportunity and Strategic Choice, McGraw-Hill, Maidenhead: England.

Dessler, G., & Tan, C. (2006). Human Resource Management: An Asian Perspective. Singapore: Prentice-Hall.

Dumont, J., Shen, J., & Deng, X. (2017). Effects of green HRM practices on employee workplace green behavior: The role of psychological green climate and employee green values. Human Resource Management, 56(4), 613-627.

Ehnert, I. (2009). Sustainable Human Resource Management. London: Springer.

Faisal, S., Naushad, M., & Faridi, M. (2020). A study on the level and relationship of job embeddedness and turnover intentions among Saudi Arabian working-class. Management Science Letters, 10(13), 3167-3172. http://doi.org/10.5267/j.msl.2020.5.005

Faisal, S., & Sulphey, M.M. (2018). A study to identify the human resource problems as perceived by employees of small and medium enterprises sector in India. Journal of Advanced Research in Dynamical and control System, 10, 7-14.

Gholami, H., Rezaei, G., Saman, M.Z.M., Sharif, S. & Zakuan, N. (2016). State-of-the-art Green HRM System: sustainability in the sports center in Malaysia using a multimethods approach and opportunities for future research. Journal of Cleaner Production. 124, 142–163.

Greening, D.W. & Turban, D.B. (2000). Corporate social performance as a competitive advantage in attracting a quality workforce, Business & Society, 39(3), 254-280.

Grolleau, G., Mzoughi, N. & Pekovic, S. (2012). Green not (only) for profit: an empirical examination of the effect of environmental-related standards on employees' recruitment, Resource and Energy Economics, 34(1), 74-92.

Guerci, M., Montanari, F., Scapolan, A. & Epifanio, A. (2016). Green and non-green recruitment practices for attracting job applicants: exploring independent and interactive effects. The International Journal of Human Resource Management, 27(2), 129-150. https://doi.org/10.1080/09585192.2015.1062040

Gupta, H. (2018). Assessing organizations performance on the basis of GHRM practices using BWM and Fuzzy TOPSIS, Journal of Environmental Management, 226, 201-216. https://doi.org/10.1016/j.jenvman.2018.08.005

Haddock-Millar, J., Sanyal, C. & Müller-Camen, M. (2016). Green human resource management: a comparative qualitative case study of a United States multinational corporation. The International Journal of Human Resource Management, 27(2), 192-211, https://doi.org/10.1080/09585192.2015.1052087

Hameed, Z., Khan, I. U., Islam, T., Sheikh, Z., & Naeem, R. M. (2020). Do green HRM practices influence employees' environmental performance? International Journal of Manpower. http://www.sheffield.ac.uk/content/1/c6/08/70/89/2008-01.pdf

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Islam, M. A., Hunt, A., Jantan, A. H., Hashim, H., & Chong, C. W. (2019). Exploring challenges and solutions in applying green human resource management practices for the sustainable workplace in the ready-made garment industry in Bangladesh. Business Strategy & Development, 1-12.

Jabbour, C. J. C., Santos, F. C. A., & Nagano, M. S. (2010). Contributions of HRM throughout the stages of environmental management: Methodological triangulation applied to companies in Brazil. The International Journal of Human Resource Management, 21, 1049–1089. http://dx.doi.org/10.1080/09585191003783512

Jabbour, C.J.C. and Santos, F.C.A. (2008). Relationships between human resource dimensions and environmental management in companies: proposal of a model, Journal of Cleaner Production, 16(1), 51-58. https://doi.org/10.1016/j.jclepro.2006.07.025

Jackson, S.E. Renwick, D. W. S. Jabbour C.J. C. & Camen, M.M. (2011), State-of-the-Art and Future Directions for Green Human Resource Management: Introduction to the Special Issue, German Journal of Research in Human Resource Management, 25(2), 99-116.

Liu, T., & Xie, P. (2013). Research on dynamic implementation of green human resources management. In Informatics and Management Science VI (pp. 83-91). Springer, London.

Longoni, A., Luzzini, D. and Guerci, M. (2016). Deploying environmental management across functions: the relationship between green human resource management and green supply chain management, Journal of Business Ethics, 151(4), 1-15. https://doi.org/10.1007/s10551-016-3228-1

Mandip, G. (2012). Green HRM: People management commitment to environmental sustainability. Research Journal of Recent Sciences, 1, 244-252.

Masri, H. A., & Jaaron, A. A. (2017). Assessing green human resources management practices in Palestinian manufacturing context: An empirical study. Journal of cleaner production, 143, 474-489.

Marcus, A. (2009). Fremeth A. Green management matters regardless. Acad Manag Perspect, 23(3), 17-26.

Milliman, J. & Clair, J. (1996), Best Environmental HRM Practices in the USA, In Wehrmeyer, W., (eds), Greening People - Human Resources and Environmental Management, Sheffield, England: Greenleaf Publishing.

Mishra, P. (2017). Green human resource management: A framework for sustainable organizational development in an emerging economy. International Journal of Organizational Analysis, 25(5), 762-788.

Mukherjee, S., Bhattacharjee, S., Paul, N., & Banerjee, U. (2020). Assessing Green Human Resource Management Practices in Higher Educational Institute. TEST Engineering & Management, 82.

Naushad, M. (2019). Intellectual capital and financial performance of Sharia-compliant banks in Saudi Arabia. Banks and Bank Systems, 14(4), 1-9.

Naushad, M., & Sulphey, M. M. (2020). Prioritizing Technology Adoption Dynamics among SMEs. TEM Journal, 9(3), 983.

Nejati, M., Rabiei, S. and Jabbour, C.J.C. (2017), Envisioning the invisible: understanding the synergy between green human resource management and green supply chain management in manufacturing firms in Iran in light of the moderating effect of employees' resistance to change, Journal of Cleaner Production, 168, 163-172.

North, K. (1997). Environmental Business Management – An Introduction, 2nd ed, International Labour Office: Geneva.

Opatha, H.H.P., Arulrajah, A.A., 2014. Green human resource management: simplified general reflections. Inernational. Business Research, 7(8), 101. https://doi.org/10.5539/ibr.v7n8p101

Opatha, P.H. (2013). Green human resource management: A simplified introduction. Proceedings of the HR Dialogue, 01(01), 11–21.

Pham, N.T., Tuckova, Z. & Jabbour, C.J.C. (2019). Greening the hospitality industry: how do green human resource management practices influence organizational citizenship behavior in hotels? A mixed-methods study, Tourism Management, 72, 386-399.

Phillips L (2007) Go green to gain the edge over rivals. People Management, 13(17), 9.

Pourshahabi, V., Pourkiani, M., Roodi, M. Z., & Sheikhi, A. (2018). Prioritizing the Sustainable Development Components to improve the level of Development with Analytical Hierarchy Process (Case Study: Sistan and Baluchestan province of Iran) Expand this title to reflect content and context. Journal of Economic Cooperation & Development, 39(4), 103-125.

Rajnoha, R., Lesnikova, P., Stefko, R., Schmidtova, J. & Formanek, I. (2019). Transformations in Strategic Business Planning in the Context of Sustainability and Business Goals Setting. Transformations in Business & Economics, Vol. 18, No 2 (47), 44-66.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Raut, R. D., Gardas, B., Luthra, S., Narkhede, B., & Mangla, S. K. (2020). Analysing green human resource management indicators of automotive service sector. International Journal of Manpower, https://doi.org/10.1108/IJM-09-2019-0435

Renwick, D. (2008). Green HRM: A review, process model, and research agenda (Discussion Paper Series). The University of Sheffield. http://www.shef.ac.uk/content/1/c6/08/70/89/2008-01.pdf

Renwick, D. W., Redman, T., & Maguire, S. (2013). Green human resource management: A review and research agenda. International Journal of Management Reviews, 15(1), 1-14.

Saaty, T. L. (2000). Fundamentals of decision making and priority theory with the analytic hierarchy process (Vol. 6). RWS publications.

Saeed, B. B., Afsar, B., Hafeez, S., Khan, I., Tahir, M., & Afridi, M. A. (2019). Promoting employee's proenvironmental behavior through green human resource management practices. Corporate Social Responsibility and Environmental Management, 26(2), 424–438.

Sammalisto, K., & Brorson, T., (2008). Training and communication in the implementation of environmental management systems (ISO 14001): a case study at the University of Gävle, Sweden. Journal of Cleaner Production, 16(3), 299–309 https://doi.org/10.1016/j.jclepro.2006

Shah, M. (2019). Green human resource management: Development of a valid measurement scale. Business Strategy and the Environment, 28(5), 771-785.

Siyambalapitiya, J., Zhang, X., & Liu, X. (2018). Green human resource management: A proposed model in the context of Sri Lanka's tourism industry. Journal of Cleaner Production, 201, 542-555.

Stringer, L (2009). The green workplace sustainable strategies that benefit employees, the environment, and the bottom line. New York, NY: Macmillan.

Sulphey, M. M., & Naushad, M. The position of intellectual capital among Saudi banks. Marketing and Management of Innovations, 10(04), 11-21.

Tang, G., Chen, Y., Jiang, Y., Paille, P., & Jia, J. (2018). Green human resource management practices: scale development and validity. Asia Pacific Journal of Human Resources, 56(1), 31-55.

TUSDAC (2005). Greening the workplace (June). A report by TUSDAC union

Wehrmeyer, W. (1996). Greening People – Human Resources and Environmental Management, 409 p. ISBN-13: 978-1874719151 ISBN-10: 1874719152

Yong, J. Y., & Mohd-Yusoff, Y. (2016). Studying the influence of strategic human resource competencies on the adoption of green human resource management practices. Industrial and Commercial Training, 48(8), 416-422.

Yong, J. Y., Yusliza, M. Y., & Fawehinmi, O. O. (2019). Green human resource management: a systematic literature review from 2007 to 2019. Benchmarking: An International Journal, 26(5), 1-24

Yong, J. Y., Yusliza, M. Y., Ramayah, T., Chiappetta Jabbour, C. J., Sehnem, S., & Mani, V. (2020). Pathways towards sustainability in manufacturing organizations: Empirical evidence on the role of green human resource management. Business Strategy and the Environment, 29(1), 212-228.

Yusoff, Y. M., & Nejati, M. (2019). A conceptual model of green hrm adoption towards sustainability in hospitality industry. In Corporate Social Responsibility: Concepts, Methodologies, Tools, and Applications (400-421). IGI Global.

Yu, W., Chavez, R., Feng, M., Wong, C. Y., & Fynes, B. (2020). Green human resource management and environmental cooperation: An ability-motivation-opportunity and contingency perspective. International Journal of Production Economics, 219, 224-235.

Yusliza, M. Y., Norazmi, N. A., Jabbour, C. J. C., Fernando, Y., Fawehinmi, O., & Seles, B. M. R. P. (2019). Top management commitment, corporate social responsibility and green human resource management. Benchmarking: An International Journal. 26(6), 2051-2078.

Zaid, A. A., Bon, A. T., & Jaaron, A. A. (2018) Green human resource management bundle practices and manufacturing organizations for performance optimization: a conceptual model. International Journal of Engineering & Technology, 7(3.20), 87-91.

Zoogah, D. B. (2011). The dynamics of Green HRM behaviors: A cognitive social information processing approach. German Journal of Human Resource Management, 25(2), 117-139.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Dr. **Shaha FAISAL** is an Assistant Professor in the College of Business Administration, Prince Sattam Bin Abdulaziz University, Al-Kharj, Saudi Arabia. His research interests include areas like HRM/OB, Entrepreneurship and behavioral finance. He has authored articles on HRM, organisational and behavioural finance, Sustainabilty and various issues in SMEs.
ORCID ID: https://orcid.org/0000-0002-7628-3751

Mohammad NAUSHAD is a Ph.D. in Commerce with a specialization in Small and Medium Enterprises (SMEs). He is currently serving as an assistant professor in Business and Management at College of Business Administration, Prince Sattam Bin Abdulaziz University, KSA. He is a committed professional with an experience of more than 11 years in academic landscape. He has worked on the various topics of entrepreneurship, teaching, learning and educational quality issues. He is currently working on multiple issues of entrepreneurship and SMEs studies.
ORCID ID: https://orcid.org/0000-0003-4421-3422

_____

COMPARATIVE ANALYSIS OF SOCIAL AND ECONOMIC EFFICIENCY IN MANAGING PRODUCT INNOVATIONS IN THE PHARMACEUTIC INDUSTRY

Zhibek Omarkhanova[1], Danagul Tleuzhanova[2], Aigul Zholmukhanova[3], Zamira Mukhambetova[4], Sholpan Alpeissova[5]

[1,2,3,4,5] *S. Seifullin Kazakh Agro Technical University, Nur-Sultan, Kazakhstan*

E-mails:[1]zhynysova@mail.ru; [2]tda_06@mail.ru; [3]ainuraphd@mail.ru; [4]zamira250172@mail.ru; [5]sholpan761@mail.ru

Abstract. Despite the variety of studies of modern innovative projects within the global pharmaceutical industry, the study of the management system for innovative projects in the pharmaceutical industry is relevant. The pharmaceutical business has a high social role in the country's economy, meeting the needs of the population in providing the necessary products. This is what determines the significant influence of the state on this sphere of economic activity, which is expressed in the mandatory fulfillment of a number of rigidly and clearly established requirements, due to which the observance of the rights of citizens in the possibility of obtaining high-quality pharmaceutical products will be ensured.The aim of the study is to consider the socio-economic characteristics of managing product innovations in pharmaceuticals (leading pharmaceutical markets) based on assessing the level of innovative activity of pharmaceutical companies, which addresses the problems of managing their role and importance in the healthcare system of Kazakhstan.

1. Introduction

A comparative analysis of the strategic goals of various economic systems allows us to talk about an objective increase in the role of innovative development in the general management system. Large-scale identification of new knowledge in various fields, as well as their combination, entails the emergence of new products and technologies. If an economic system of any scale and type of activity ceases to pay attention to innovation processes, then sooner or later this will lead, if not to the termination of its functioning as an economic system,

then to a decrease in the efficiency of activity. Innovation management is becoming a necessary element of economic development, since it allows us to differentiate in advance and identify the usefulness or hopelessness of an innovation, eliminate contradictions between innovations and existing old technologies, equipment, products, etc., as well as take into account the state policy in the field of innovation and scientific research.

The pharmaceutical market is an important sector of the economy of any country and is a criterion for its economic and social development, the level of well-being of the population. With the beginning of a large-scale diversification of the economy in Kazakhstan, industries that are fundamentally new for the country have appeared. The implementation of the state program for industrial and innovative development has borne fruit: machine building, petrochemistry, food production and a host of other new industries are developing in the country. One of the key, and without exaggeration, vital for every citizen of Kazakhstan, has become the pharmaceutical industry. The development of the pharmaceutical industry in Kazakhstan provides for a complex of organizational, economic, technological, managerial measures aimed at the design, construction and commissioning of pharmaceutical industries, the introduction of production technologies, research and development work for the development and development of the production of new competitive drugs , the creation of raw material bases in the regions from domestic medicinal plant materials, training of personnel for pharmaceutical production in accordance with GMP, which should ultimately contribute to an increase in the volume of domestically produced products, subject to state support for local pharmaceutical production, sustainable growth of the pharmaceutical market in recent years, and overall positive macroeconomic climate, Kazakhstan is becoming an attractive destination for pharmaceutical companies as a target market and region of the global center.

2. Research background

Most scientists who have studied the dynamics of the development of pharmaceuticals and the innovation processes characteristic of it indicated that in recent decades the industry has undergone continuous intensive changes both in business models and in production and research activities, while the cost of innovative medicines has risen. So, Rozhnova S.A., Tsypkina A.V. (2017) show the extremely important role of the stages of development of pharmaceutical products, which require detailed study, since they require more time and economic costs.We would also like to note that the strategic development of the pharmaceutical industry is subject to the influence of demographic trends: characteristic diseases corresponding to aging determine the focus of R&D and the directions of global investment activity in the industry. In this process, multinational corporations play a predominant role, locking in innovation processes and investing huge amounts of money in R&D.

In his scientific research, Scannell J. W. (2017) describes the profitability of drugs entering the market that are entirely dependent on their innovation and special status, supported by a patent mechanism. In the past two decades, the effective duration of the patent period has dropped significantly. This is due to the lengthening of the period of clinical trials and the timing of the review by regulators of the results of these trials in order to make a decision on the admission of innovative medicines to the market.

As a result, companies seek to recover costs in a shorter sales period and inflate the price of medicines. To this end, companies strive to release drugs at the same time with a high price and a potentially large sales market. That is, choose those therapeutic categories where, for example, the country's medical insurance system is ready to purchase a large number of expensive medicines (in accordance with the existing priorities in the country) (Philippidis, 2017).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Many scientists, including A. Bachman, J. Cantwell (2017), focused on the role of small companies in the innovative development of knowledge-intensive industries, including pharmaceuticals. As they pointed out, the development of information technologies leads to the convergence of technological competencies and knowledge among the largest high-tech companies - knowledge becomes more accessible for transfer, and globalization and internationalization of TNCs accelerate the exchange of knowledge between companies from different regions of the world and, more importantly, from different industries.

For example, if in the past industrial enterprises simply transferred knowledge about methods and processes from one production to another, then information technology has created an environment in which the interpenetration of various competencies takes place, which gives wider opportunities for innovative development. All this opens up prospects for a further global innovation leap, caused not so much by a specific technology (including technologies of widespread use), but by the emergence of a fundamentally new sectoral structure of the world economy. In such a situation, the sources (points of origin) of innovations and the mechanisms of interaction between them and established companies (in pharmaceuticals, mainly TNCs) change. In particular, many researchers highlight the growing role of pharmaceutical alliances and joint ventures, as well as independent researchers. That is, the innovation process ceases to be linear and goes beyond TNCs, opening up opportunities for small businesses and innovative start-ups.

According to the studies of Cantwell J. A., Bachmann A. (2017), an important role is also played by competition between developed and developing countries, as well as intra-industry competition between generic manufacturers and leading TNCs focusing on patented drugs.

Many scientists analyze the innovative indicators of the development of the world economy over the past ten years, which shows that in search of competitive advantages and effective technological solutions, the world's largest corporations have begun to increase investments in R&D (Ivanova, N., Mamadyarov, Z., 2019).

In their studies, Zervas G., Proserpio D., Byers J.W. (2017) highlight the development of the phenomenon of the shared economy (sharingeconomy), the intensification of the use of outsourcing, the changing role of small and medium-sized enterprises in a number of industrial and high-tech sectors of the economy, among which pharmaceuticals occupy an important place.

Most scientists, such as, for example, KoganL. (2017), who studied the dynamics of the development of pharmaceuticals and the innovation processes characteristic of it, indicated that in the past decade the industry has undergone continuous intensive changes both in business models and in production and research activities.Globalization played a key role in the intensive growth of the pharmaceutical industry, stimulated an increase in product sales and growth in the capitalization of leading TNCs. At the same time, globalization has led to increased competition in the pharmaceutical market, the emergence of a powerful generics market and the erosion of the share of leading TNCs in it. The largest pharmaceutical companies have already intensified their search for new opportunities for cooperation, have begun to develop new business models, trying to maintain their positions against the background of growing competition, and have tried to launch the process of transforming the industry from within, using the advanced capabilities of information technology (Schweitzer, S., Lu, Z., 2018).

The international activities of pharmaceutical TNCs are concluded in three main geographic regions of the planet: North America (up to 50% of the world market), Europe and Asia - primarily the USA, EU and Japan. China also plays a role - in addition to the potential of a huge domestic market, China is of key importance in supplying the world market with the primary substances necessary for the creation of drugs. It should be noted that for a long

time China remained relatively inaccessible to world TNCs, and only in recent years there have been tendencies for the activation of foreign TNCs in the Chinese market, strengthening of patent legislation and serious shifts in the mechanisms of pricing and R&D support (Hu, J., Mossialos, E., 2016).

Further development of the industry will depend on innovative success in pharmaceuticals and the reaction of leading TNCs to the ongoing changes (Kruger, H., 2018).Therefore, one of the main tasks of the state in the pharmaceutical industry is to achieve 50% of the domestic market supply with domestic pharmaceuticals.

Progress in the pharmaceutical industry does not stand still. The companies, together with scientific organizations, are actively working to find advanced approaches to pharmacotherapy. Pharmaceutical manufacturers spend about $ 150 billion annually on research and development. As a rule, out of thousands of compounds, only a small number of molecules receive approval for subsequent introduction into clinical practice. In general, in recent years, the largest number of new molecules at different stages of development or clinical trials fell on the segment of drugs for the treatment of cancer. The attention of pharmaceutical companies is also focused on such therapeutic areas as infectious diseases, neurology, hematology, endocrinology, allergy and immunology, cardiovascular and respiratory diseases, etc. (Bervelt, P., Dooren, V., 2019).

According to the forecast of IQVIA experts, by 2023 the global market for oncological drugs will grow to $ 140-150 billion, retaining its leading position among other therapeutic areas in terms of costs. Significant growth by 2023 should also be expected in the segment of drugs for the treatment of diabetes mellitus, the capacity of which will amount to 115-125 billion dollars. At the same time, the volume of the pharmaceutical market as a whole by 2023 will reach about 1.5 trillion dollars (IQWIA, 2019).

In her scientific research, Y. Prozherina (2019)analyzes the dynamics of the development of the global pharmaceutical market, which provides a forecast by 2023 with an emphasis on the growth of cancer drugs, which will grow to $ 140-150 billion, while maintaining a leading position among other therapeutic areas in terms of costs. Significant growth by 2023 should also be expected in the segment of drugs for the treatment of diabetes mellitus, the capacity of which will be 115-125 billion dollars. At the same time, the volume of the pharmaceutical market as a whole by 2023 will reach about 1.5 trillion dollars.

Analysis of the factors that determine the state and development of the global pharmaceutical industry, according to the research of T.A.Bizunok (2019), also indicates a high level of development of the pharmaceutical industry in economically developed countries, which is facilitated by the pharmaceutical transnational corporations created by them.

The growth of the global pharmaceutical industry is mainly due to the growth of the pharmaceutical markets of the BRICS countries, which include Brazil, Russia, India, China and South Africa (Kostin, K., Adams, R., Samli, C., 2015).

One of the key tasks facing the pharmaceutical industry of the BRICS countries today is to achieve a balance: on the one hand, it is required to provide citizens with vital, latest and most effective medicines, and on the other, to comply with the commercial interests of Big Pharma (Maksimtsev, I., Karlik, A., Yakovleva, E., 2016).

It should be noted that China stands out significantly against the background of other BRICS countries in terms of R&D expenditures. Moreover, at the beginning of the XXI century. countries started off with roughly the same indicators. However, it was China, developing its economy that stimulated the development of research and development and, in particular, the pharmaceutical sector (Plotnikov, V., Kuznetsova, V., 2018).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Currently, there is a need to solve a whole range of problems that impede the introduction of innovative drugs to the market, which requires an institutional approach, i.e. taking measures of a political, legal, social, organizational, scientific, technical and economic nature. In his research, A.A.Semin (2017) examines the institutional mechanisms for increasing the productivity of scientific research in the development of innovative medicines, consisting in improving institutions: public procurement, state registration of medicines, state support for small and medium-sized businesses, state scientific and technical policy, science and education, international relations.

Focusing on the Russian experience, C.Rudisill, S. Vandoros, J. Antoun (2014.) based on the current political and regulatory environment, it was proposed the possibility of switching to cost-based pricing, and in the short term - to introduce direct price negotiations and drug pricing in accordance with reference countries using the assessment of medical technologies.

The leading approach to the study of this issue, in accordance with the position of S.I.Ashmarina, A.V. Streltsov, A.M. Izmailov, E.M.Dorozhkin, M.Vochozka (2016) is an analytical approach that allows to determine the main directions of restoring the competitiveness of the pharmaceutical industry.

In the management of product innovations in the pharmaceutical industry, the marketing aspects of product innovations, pricing and stock options of the brand, as well as exclusivity options available through government regulators (Ding, Eliashberg, Stremersch, 2014).

Pharmaceutical policy in countries with a developing healthcare system has its own characteristics, which depend on the level of socio-economic status, as described in their research by W. Kaplan, N. Boskovic, D. Flanagan, S. Lalany, Ch. Ying Lin, Z. Ud Din Babar (2017.).

Thus, pharmaceutic are the most high technology industry in the world economy with research and development in the total sales of more than 14%, which in monetary terms in 2022 is expected to grow to $ 182 billion (Lin, Goncharov, Ivichev, 2016.).

3. Researchquestions

The dynamic development of the pharmaceutical market, the high organizational dynamics of its subjects and the increased competition impose new requirements on the organization of management of pharmaceutical enterprises. In these conditions, it is strategically important to determine the main directions for increasing competitiveness, based on the characteristics of a specific production of medicines, which is largely determined by the efficiency of organizing production processes, the use of limited resources, responsiveness to market conditions and flexibility in production management

For effective management of product innovations in the pharmaceutical industry, it is necessary to systematize the factors of innovative development of the industry, to identify problems in the market of innovative medicines, as well as opportunities for managing innovative activities of pharmaceutical enterprises. Therefore, in order to analyze the effectiveness of the management system for innovative projects in the pharmaceutical industry of the Republic of Kazakhstan, the author considered the main indicators of health care development and it's financing, which affect the further development of product innovations in the pharmaceutical industry. As a result, the dependence of the number of medical personnel in the pharmaceutical industry on the number of medical institutions and the amount of funding was revealed (Figure 1).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

The pharmaceutical business has a high social role in the country's economy, meeting the needs of the population in providing the necessary products. This is what determines the significant influence of the state on this sphere of economic activity, which is expressed in the mandatory fulfillment of a number of rigidly and clearly established requirements, in particular, the effective management of product innovations in the pharmaceutical industry.
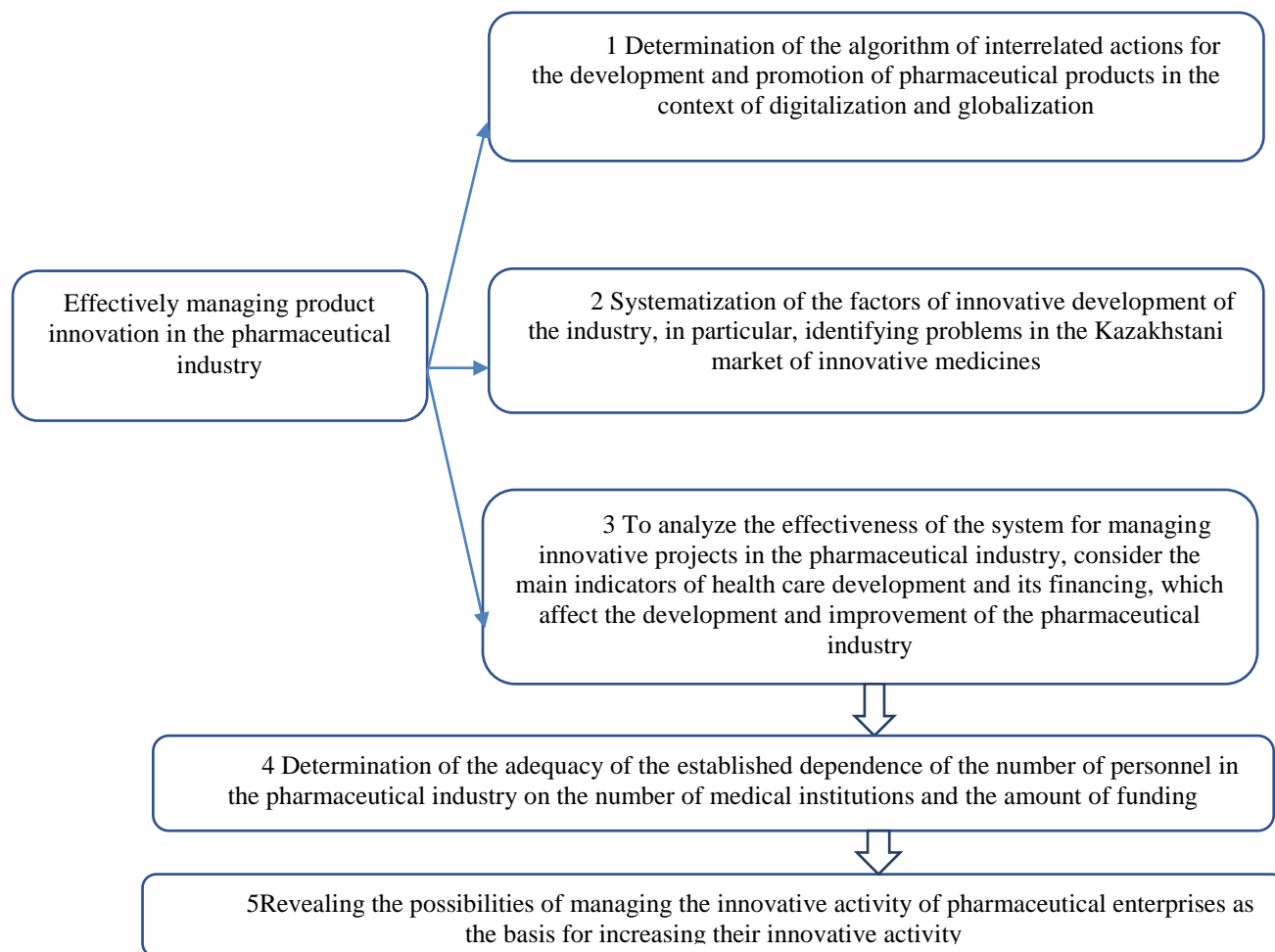
Figure 1. Research questions
Source: compiled by authors

Scientific novelty consists in a comprehensive study of innovative processes in the pharmaceutical industry, which will reveal the specifics and prospects for the development of the industry.

4. Methodologic approach and data analysis

The pharmaceutical industry is also one of the most socially significant segments of the economy. The results of the work of pharmaceutical companies have a significant impact on the health of the population and constitute an

important part of the healthcare systems of the countries of the world. The latest drugs, including vaccines, are critical to the stability of the global health system and are therefore strictly controlled by national regulators as well as international organizations such as the World Health Organization. All this determines the strategic nature of the industry both for the economic development of countries and their research potential. With all its scale and global character, the functioning of the pharmaceutical industry in each specific country depends both on the decisions and policies of local regulators and industry institutions, and on the level of participation of local companies in the global pharmaceutical market (Mamedyarov, Z., 2019).

In this regard, the decisive tasks of the state in the formation of the pharmaceutical market in Kazakhstan are:
- modernization of existing production facilities and construction of new pharmaceutical enterprises as part of the implementation of investment projects;
- implementation of international quality standards; i.e. Good Manufacturing Practice (GMP) at pharmaceutical industry enterprises;
- creation of conditions for import substitution of pharmaceutical and medical products based on modern technologies in accordance with international GMP standards;
- providing the industry with qualified personnel.

The development of the pharmaceutical industry in Kazakhstan provides for a complex of organizational, economic, technological, managerial measures aimed at the design, construction and commissioning of pharmaceutical industries, the introduction of production technologies, research and development work for the development and development of production of new competitive drugs, the creation of raw material bases in the regions from domestic medicinal plant materials, training of personnel for pharmaceutical production in accordance with GMP, which should ultimately contribute to an increase in the volume of domestically produced products.

Today, the domestic pharmaceutical industry is engaged in the research, development, mass production and distribution of medicines, medical products and medical equipment. At the moment, more than 200 pharmaceutical enterprises operate in the Kazakhstan market. 12 production sites of 8 domestic pharmaceutical companies received GMP (Good Manufacturing Practice) certificates (Table 1).

Table 1. InternationalGMPstandardsatdomesticpharmaceuticalcompaniesinKazakhstan

№	Enterprise	Production area
1	JSC «Nobel AFF»	Solid Medicines Workshop
		Workshop for liquid and soft medicines
2	JSC «Khimfarm»	Aseptic powdering workshop
		Workshop for the production of injection solutions in ampoules, syringe filling
		Production lines of injection solutions of the workshop of injection solutions and infusion
3	LLP «VIVA Pharm»	Solid Medicines Manufacturing Site
4	LLP «FitOleum»	Production area for oil extracts
		Suppository production site
5	LLP «EikosPharm»	Solid Medicines Manufacturing Site
6	LLP «Kelun-KazPharm»	Production area for infusion solutions
7	LLP «PFK «Eleas»	Sterile Medicines Dispensing Workshop
8	LLP «DOSPHARM»	Conducting preclinical and clinical studies, introducing drugs into the production

Source: compiled by authors according to Data of the Ministry of Health and Social Development of the Republic of Kazakhstan

It should be noted that most of them are enterprises with foreign participation. The presence of GMP certificates for certain industries should help to increase the output of manufactured products and contribute to a more free

promotion of domestic drugs to foreign markets. Of course, the state has a significant impact on the formation of the pharmaceutical market - this is:
- provision of a guaranteed volume of free medical care (guaranteed volume of medical care);
- support for domestic manufacturers within the framework of existing programs.
In fact, in order to develop the market, it was necessary to radically reform the entire system - production, import, registration and certification of medicines. Today, the country has streamlined activities for registration, certification, and quality control of medicines, medical devices and medical equipment, as well as their advertising. The National Medicines Information Center was created; state regulation of prices for medicines purchased from the budget was introduced. Also in Kazakhstan, a unified distribution system for medicines and medical products was created in the person of LLP SK-Pharmacia, which made it possible to ensure transparency of the public procurement of medicines market, bring it closer to the existing international standards of logistics, storage and distribution. All these measures brought their results.

In many respects, the current success of Kazakhstan producers is facilitated by the support they receive from the state, in particular, in public procurement (long-term contracts).

Within the framework of the State Program of Industrial and Innovative Development for 2015-2019, there are various tools to support business, including for pharmaceutical companies. Programs such as:
- "Business Roadmap 2020" (Official site of the Government of the RK, Business Roadmap 2020);
- "Exporter 2020" (Official site of the Government of the RK, Exporter 2020);
- "Employment 2020" (Official site of the Government of the RK, Employment program 2020);
- "Map of the industrialization of Kazakhstan for 2015-2019" (Official site of the Government of the RK, State program, 2015-2019);
- the program "Productivity 2020" and are aimed specifically at increasing the competitiveness of domestic enterprises by stimulating the production, export, personnel and technological potential of enterprises (Official site of the Government of the RK, Business Roadmap 2020).

And although, in general, according to the results of the first half of 2019, the volume of purchases of pharmaceutical products for guaranteed medical care in value and physical terms decreased, the share of Kazakhstani manufacturers increased - in physical terms from 59% in the first half of 2018 to 66.3% in the first half of 2019. year, in value terms - from 19% to 23.2%, respectively. But Kazakhstani producers are not only increasing their presence in the public procurement sector. They are systematically increasing sales in the retail segment, which is very important, since its volume is several times higher than the procurement segment for guaranteed volume of medical care, both in value and in kind. It is clear that they have to work in this segment without any support. on a par with other market participants, in a highly competitive environment for doctors' recognition and consumer preferences.As already noted, long-term contracts are a significant incentive for the construction of new or modernization of existing production sites in accordance with international GMP standards. After all, this is the main condition for their conclusion. So, since the beginning of the application of this support measure, 24 production sites have appeared in the republic, operating according to GMP rules.

The results for the first half of 2019 show that the Kazakh pharmaceutical market is going through difficult times. This is mainly due to the economic situation, the policy of the regulator aimed at rationalizing the costs of medicines purchased for the guaranteed volume of medical care. The high volatility of the national currency rate, the decrease in the purchasing power of the population and the related change in the structure of demand in favor of cheaper synonymous drugs make their contribution.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Only local producers are increasing their market share. Especially in the procurement segment for guaranteed volume of medical care. According to the Pharmacy Committee of the Ministry of Health of the Republic of Kazakhstan and LLP SK-Pharmacy, for 2019, the Single Distributor has already purchased 536 names of drugs and medical devices in the amount of 50.4 billion tenge for the provision of guaranteed medical care (Table 2).

Table 2. TOP-8 domestic manufacturers of medicines (A) and medical devices (B) in terms of the purchase amount for the guaranteed volume of medical care (tender, contract, agreement) for 2019

(in mln tenge)

Domestic manufacturers	medicines (A)		Domestic manufacturers	medicines (B)	
	mln tenge	share among OTP, %		mln tenge	share among OTP, %
Santo (JSC «KhimFarm»)	12664	25,1	JSC «Dolce»	2652	5,3
JSC «Nobel AFF»	12622	25	JSC «Aksel and A»	2122	4,2
JSC «Abdi International»	7193	14,3	JSC «Super Pharm»		3
JSC «Nur May Pharmacia»	1913	3,8	JSC«KazMedProm»	1395	2,8
JSC«EcoPharmInternational»	1895	3,8	JSC «Almerek»	740	1,5
JSC «VIVA Pharm»	1483	2,9	Wellness center of Masimov	680	1,3
JSC «Kelun-Kazpharm»	1337	2,7	JSC «Juldyz Kenan»	271	0,5
Others	1610	3,2	JSC «Sultan»	123	0,2
			Others	215	0,4

Source: compiled by authors according to Data of the Ministry of Health and Social Development of the Republic of Kazakhstan

At the end of the first half of 2019, Kazakhstan took the first position in the ranking of producer countries in terms of market share. Only time will tell whether domestic producers will be able to retain their leading position in the future. But, certain prerequisites for this already exist.

Based on the available data on the sales volume of SANTO in the Kazakhstani pharmaceutical market, we will build a trend model with the help of which we will calculate the forecast value of the indicator under consideration for 2020.

Analytical methods for identifying trends in a time series are implemented within the framework of regression models, in which the variable acts as a dependent variable y_t, in our case, the sales volume, and in the role of the only explanatory variable time t.

The trend parameters are estimated using the least squares method, i.e. are selected in such a way that the graph of the function is located at a minimum distance from the points of the original data. According to OLS, when estimating model parameters, all observations are assigned equal weights, i.e. their information value is recognized as equal, and the development trend throughout the entire observation area is unchanged. Let's build a graph of the dynamics of sales for 2013-2018 (Figure 2).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810
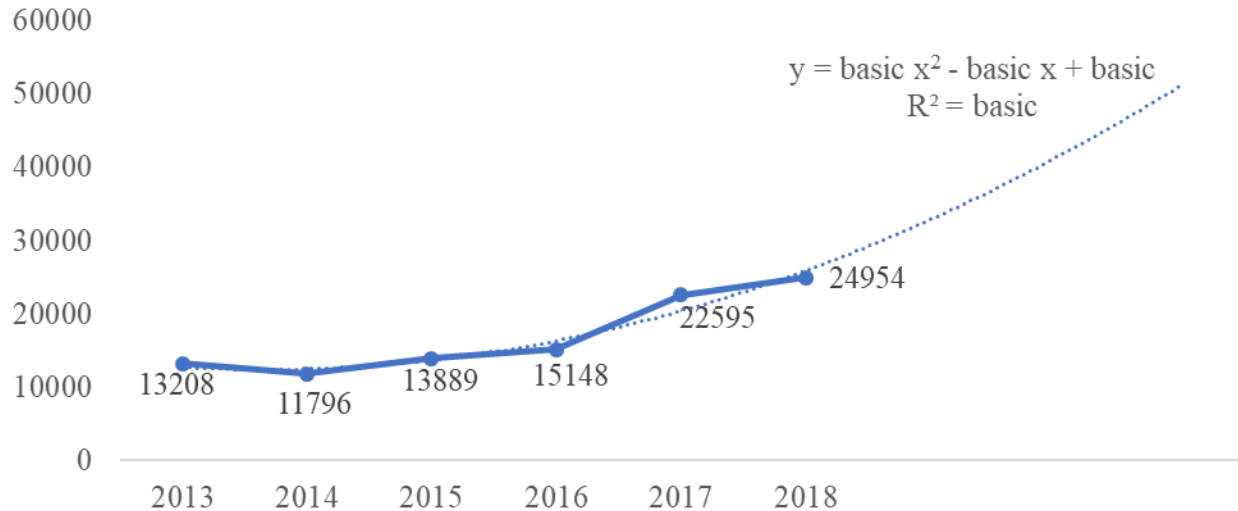

Figure 2. Dynamics of sales volume, in million tenge
Source: compiled by authors

Graphical analysis indicates the closeness of the development of the considered indicator to the parabolic shape. Using the "Data Analysis" Excel setting, we will build a parabolic trend. The regression analysis protocol is shown in Figure 3.

CONCLUSION OF THE RESULTS

Regression statistics	
Multiple R	0,973240196
R-square	0,947196479
Normalized R-square	0,911994131
Standard error	1620,040941
Observations	6

Analysis of variance

	df	SS
Regression	2	141237631,4
Remainder	3	7873597,95
Total	5	149111229,3

	Coefficients	Standard error
Y- intersection	14404,9	2898,017336
t	-2394,275	1895,96213
t^2	719,125	265,1414372

Figure 3. Protocol for performing regression analysis
Source: compiled by authors

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Thus, the parabolic trend equation will take the form:

$$y_t = 14404,9 - 2394,275t + 719,125t^2.$$

To determine the predicted values of the sales volume, it is necessary to substitute the corresponding value of the time parameter into the resulting model ($t = 7$ и $t = 8$):

$$y_7 = 14404,9 - 2394,275 \cdot 7 + 719,125 \cdot 7^2 = 32882,1 \text{ mln.tenge;}$$

$$y_8 = 14404,9 - 2394,275 \cdot 8 + 719,125 \cdot 8^2 = 41274,7 \text{ mln.tenge.}$$

Thus, the forecasted values of the sales volume for 2019 amounted to 32882.1 million tenge, and in 2020, respectively, will amount to 41,274.7 million tenge.

According to the Pharmacy Committee of the Ministry of Health of the Republic of Kazakhstan and LLP SK-Pharmacy, in 2019, the range of domestic pharmaceutical products purchased under long-term contracts will increase to 493 drugs and medical devices (231 drugs, 262 medical supplies), and by 2021 it will be replenished another 112 drugs and 32 medical devices. At the same time, domestic companies demonstrated the highest sales growth rates, which significantly outstrip the growth of the pharmacy segment as a whole (Figure 4).
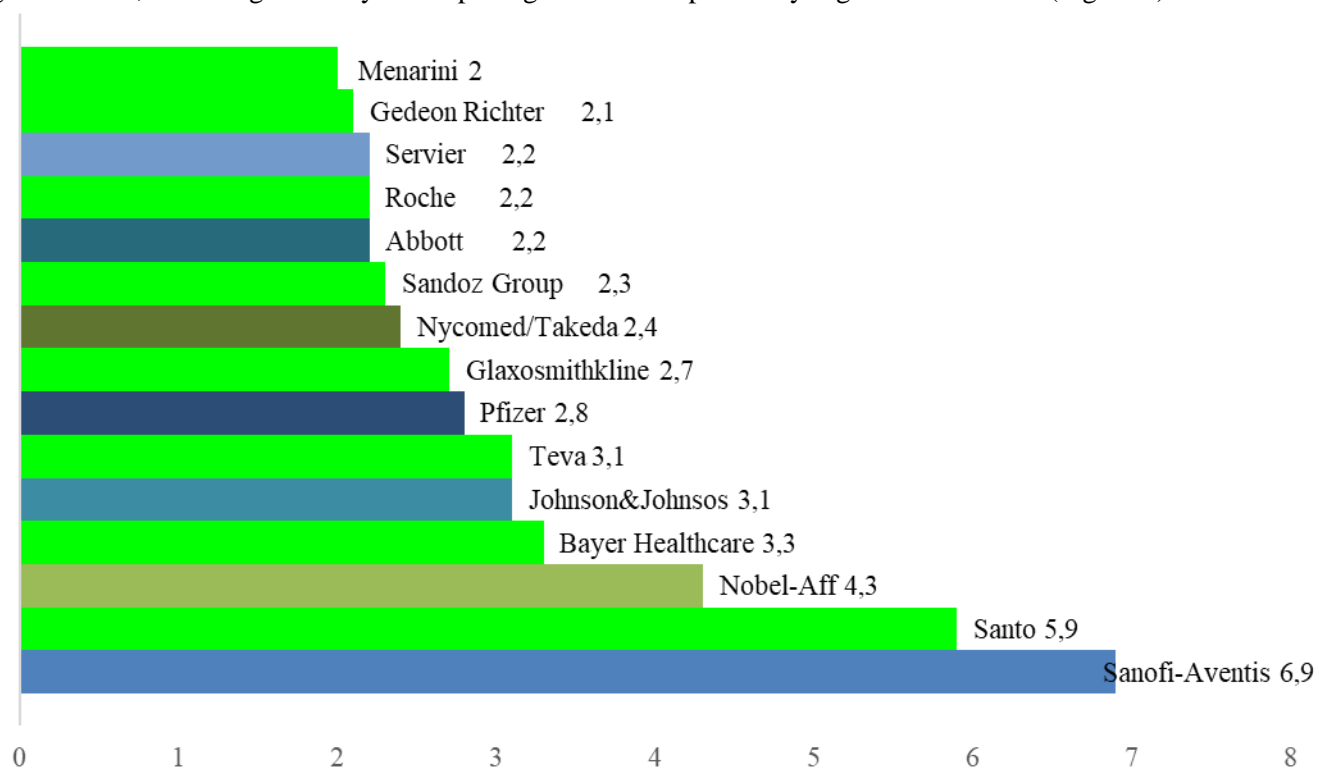
Figure 4. TOP-15 companies in the Kazakhstan market for 2019, (%)
Source: compiled by authors according to resource of www.pharm.reviews

In this regard, an increase in the purchase volume of the Single Distributor of domestic pharmaceutical products in monetary terms from 30 billion tenge to 73 billion tenge in 2024 is forecasted. This will help to increase the share in the budget segment, and if Kazakhstan pharmaceutical manufacturers continue to develop as actively in retail, they will have every chance to remain number 1 on the market.

Today, drug provision of the population is one of the most acute social problems in the system of state interests. It is no secret that at this stage, the country's drug supply is not effective enough and the costs are growing, a significant part of the population does not receive the necessary drugs.

Focusing on innovation, it is necessary to understand that innovation in the pharmaceutical sector is costly and unpredictable in terms of results, since it requires significant R&D expenditures in order to invent and test new drugs. Pharmaceutical companies can spend up to 10-15 years developing new drugs until they enter the market. During this time, companies incur significant costs with the high risks that new drugs may not pass clinical trials. Hence, the retail price for drugs that have successfully passed clinical trials and brought to the market is usually high, since the manufacturer must compensate for its costs. As a consequence, innovation in the pharmaceutical industry offers more patent protection than any other industry. Patent protection allows pharmaceutical companies to recover the substantial costs of inventing, testing new drugs, and obtaining regulatory approval for placing them on the market. However, determining the optimal balance between the level of innovation and the optimal timing and scope of intellectual property protection is an extremely difficult task, and each state solves this task in its own way.

By analyzing customer preferences and applying the latest technologies, it is possible to promote products in a more targeted manner, taking into account the characteristics of each target group, which increases the efficiency of promotion costs. For this you need to learn new tools and master them. In this regard, we propose a certain algorithm of interrelated actions for the development and promotion of pharmaceutical products in the context of digitalization and globalization (Figure 5).

Pharmaceutical companies need to use new channels of promotion, not limited to the activities of medical representatives, to introduce omnichannel models. This requires systematic targeted work, which includes the following components:
1) setting goals for the effectiveness of new product development;
2) creating partnerships with other companies, medical institutions, scientific institutions, as well as regularly analyzing trends and best practices to obtain new ideas from external sources and develop new dosage forms (including through the acquisition of biotech startups);
3) development of new competencies in a number of areas:
- the use of digital technologies, for example, for working with large amounts of data and using artificial intelligence;
- portfolio management of innovative ideas;
- building partnerships, including searching for and buying promising startups or shares in them;
- development of export markets;
4) the use of new approaches to work with portfolios of innovations in the field of products, processes and business models, in particular, mastering the methods used in the field of venture capital;
5) improving the efficiency of the research and development process:
- using digital technologies, rapid prototyping based on the Agile model, involving a large number of participants in the process;

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

6) the development of the function of fast time-to-market for new products, including the use of RWE's practical evidence base and innovative pricing methods (risk sharing concept).
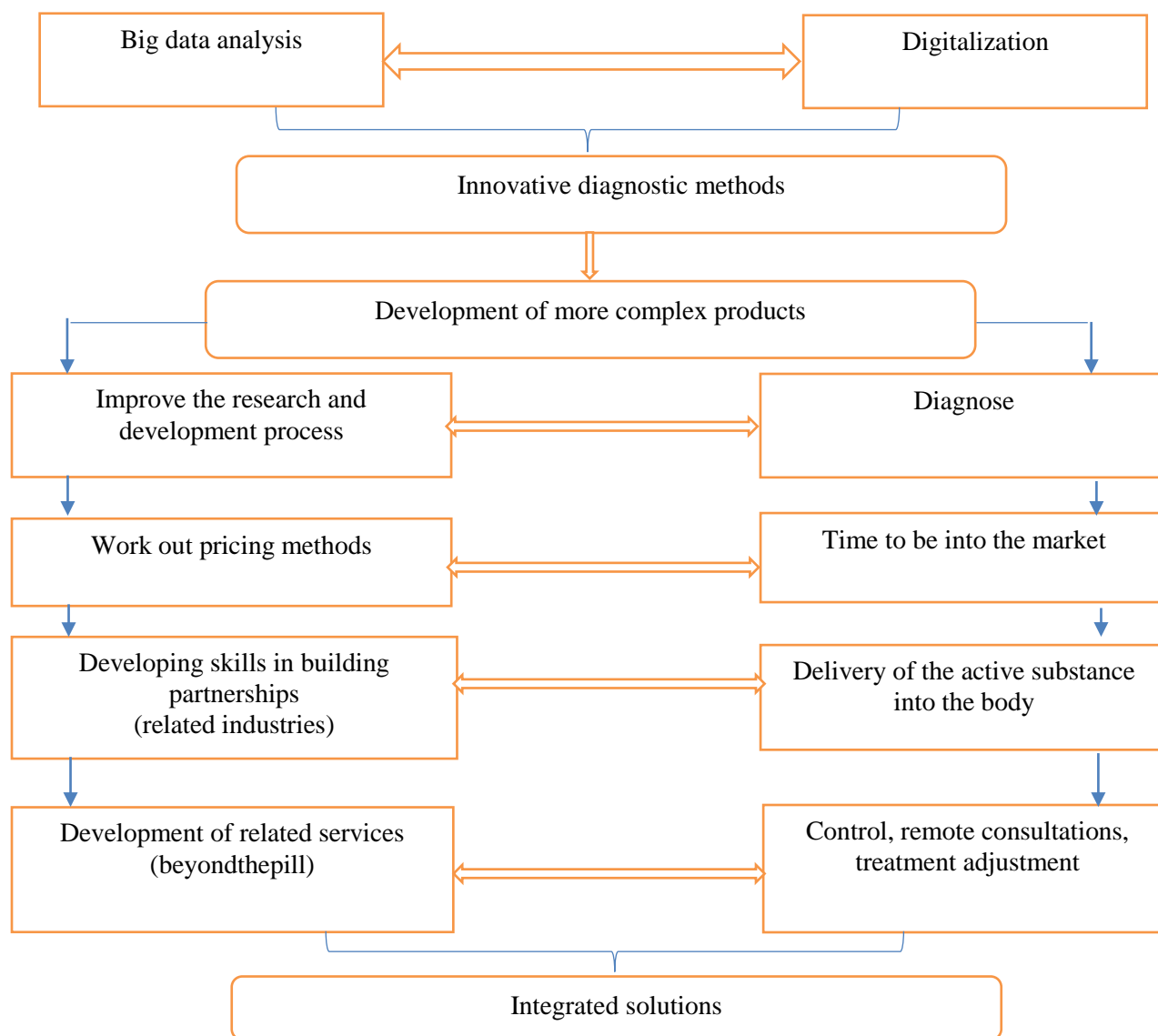

Figure 5. Algorithm of interrelated actions for the development and promotion of pharmaceutical products in the context of digitalization and globalization
Source: compiled by authors

The introduction of innovations is becoming one of the priority instruments for ensuring the growth of the state economy. Innovation is an effective tool in the competition, as it definitely leads to a company of welfare, to attract inevitable investments, as well as to the formation of new effective demand.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

In today's environment, only pharmaceutical companies that have sufficient sales volume, have an optimized structure for working with clients and possess the necessary new concepts for successful operation can be able to conduct a profitable business. In this regard, the role of the pharmaceutical industry in healthcare, in particular, for the Republic of Kazakhstan is obvious and huge.

The author uses a project approach to innovation and investment activity, which is based on the principle of cash flows, a feature of which is its predictive and long-term nature, where the analysis takes into account the time factor and the risk factor. At the same time, the effectiveness is determined on the basis of Methodological Recommendations for assessing the effectiveness of innovative projects and their selection for financing.

Therefore, to analyze the effectiveness of the management system for innovative projects in the pharmaceutical industry, we will consider the main indicators of health care development and its financing, which affect the development and improvement of the pharmaceutical industry (Table 3, 4).

Table 3. Key indicators of health care development in Kazakhstan

Indicators	2015	2016	2017	2018	2019	Growth in 2019 compared to 2015, in %
The number of doctors of all specialties in the pharmaceutical industry, in thousands of people	54,6	54,8	55,5	57,3	59,4	108,8
per 10 000 population	36,5	36,3	36,5	37,6	38,4	105,2
Number of nursing staff in the pharmaceutical industry, in thousands of people	115	117	119,6	125,2	130	113,0
per 10 000 population	76,9	77,6	78,6	81,8	84	109,2
Number of hospitals (using pharmaceutical products)	1029	1042	1063	1086	1055	102,5
Number of medical institutions	3463	3462	3434	3609	3896	112,5

Source: compiled by authors according to Data of JSC Kazakhstan Industry Development Institute (KIDI)

Table 4. Amount of healthcare financing in Kazakhstan

Indicator	2015	2016	2017	2018	2019	Growth in 2019 compared to 2015, in %
Amount of financing, total billion tenge	131,2	187,1	231,1	309,5	403,5	307,5
per capita (total), in tenge	8 740	12 298	15 184	20 105	25932	296,7
per 1 inhabitant (local level), in tenge	7 097	9 946	12 304	17 344	22542	317,6
Financing volume of guaranteed volume of medical care, total billion tenge	90,5	118,5	139,6	195,1	225,6	249,3
per capita (total), in tenge	6 025	7 785	9 172	12 673	14488	240,4
per 1 inhabitant (local level), in tenge	5 433	7 405	8 728	11 969	14745	271,4
share of guaranteed volume	68,9	63,3	60,4	63,0	55,8	80,9

Source: compiled by authors

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

5. Mathematical approach

Having considered the main indicators of health care development, as well as the amount of financing of health care in Kazakhstan for the period from 2015-2019, which were analyzed in Tables 3 and 4, their average values were identified and the forecast of expenditures for priority areas of the health care system is shown using regression analysis (Table 5).

For the analysis of costs, as a resultant attribute, such an indicator as the total expenditure of healthcare financing, which affects the further development of the pharmaceutical industry, was taken as a basis, and the factors affecting the resulting attribute:

x1 - inpatient care;
x2 - PHC;
x3 - construction and reconstruction of healthcare facilities;
x4 - medical education and science;
x5 - other expenses, including SES;
x6 - priority areas.

Table 5. Forecast of expenditures for priority areas of the health care system of the Republic of Kazakhstan

Indicator	Sign	Average value in 5 years	Calculation formula	Credibility	Forecast 2020	Forecast 2021
Total consumption	y	319,36	Y=76,1X+90,9	$R^2 = 0{,}98$	547,5	623,6
Inpatient assistance	x1	86,54	Y=9,29X1+58,6	$R^2 = 0{,}98$	114,3	123,6
PHC	x2	65,76	Y= 34,802exp(0,19 x^2)	$R^2 = 0{,}99$	108,43	131,04
Construction and reconstruction of healthcare facilities	x3	66,26	Y=16,81X3+15,8	$R^2 = 0{,}97$	116,6	133,47
Medical education and science	x4	10,3	Y=2,55X4+2,65	$R^2 = 0{,}99$	17,95	20,5
Other expenses	x5	15,88	Y=5,9X5-1,82	$R^2 = 0{,}97$	33,58	39,48
Priority directions	x6	74,62	Y=28,5X6-11,03	$R^2 = 0{,}97$	159,97	188,47

Source: compiled by authors according to Data of JSC Kazakhstan Industry Development Institute (KIDI)

Analyzing the data in Table 5, the following should be noted:
1) if the expenditure on inpatient care is increased by 1 unit, the total expenditure will increase by 0.29 units.
2) if the consumption for PHC is increased by 1 unit, the total consumption will increase exp (0.19) times.
3) if the expenditure on the construction and reconstruction of healthcare facilities is increased by 1 unit, the total expenditure will increase by 16.81 units.
4) if the expenditure on medical education and science is increased by 1 unit, the total expenditure will increase by 2.55 units.
5) if other expenses, including SES, are increased by 1 unit, the total consumption will increase by 5.9 units.
6) if the consumption for priority areas is increased by 1 unit, the total consumption will increase by 28.5 units.
Elasticity coefficient:

1) if the expenditure on inpatient care is increased by 1%, the total expenditure will increase on average by 0.93%.
2) if the expenditure on PHC is increased by 1%, the total expenditure will increase on average by 12.49%.
3) if the expenditure on the construction and reconstruction of healthcare facilities is increased by 1%, the total expenditure will increase on average by 0.99%.
4) if the expenditure on medical education and science is increased by 1%, the total expenditure will increase on average by 0.91%.
5) if other expenses, including SES, are increased by 1%., The total expense will increase on average by 1.02% units.
6) if the expenditure on priority areas is increased by 1%, the total expenditure will increase by 1.01% on average.
Thus, the total expenditure is more influenced by other expenditures, including SES (1.02%) and expenditures on priority areas (1.01%), to a lesser extent, expenditures on construction and reconstruction of healthcare facilities (0.99%) and the least influence have expenses for inpatient care (0.93%) and for medical education and science (0.91%).
on the number of honey. staff in the pharmaceutical industry is more influenced by the number of clinics than by funding.
Let us establish the dependence of the number of honey. personnel in the pharmaceutical industry from the number of medical institutions and the amount of financing of the guaranteed volume of medical care.
Let be:
y - number of medical personnel (doctors and paramedical personnel in the pharmaceutical industry) - thousand people;
x_1 - number of medical institutions - thousand units;
x_2 - volume of financing guaranteed by the guaranteed volume of medical care - billion tenge.
We will look for a two-factor regression equation in the following form:

$$y = a + b_1 x_1 + b_2 x_2, \qquad (1)$$

The system of normal equations for determining the coefficients of the regression equation is:

$$\begin{cases} na + b_1 \sum x_1 + b_2 \sum x_2 = \sum y \\ a \sum x_1 + b_1 \sum x_1^2 + b_2 \sum x_1 \cdot x_2 = \sum y \cdot x_1 \\ a \sum x_2 + b_1 \sum x_1 \cdot x_2 + b_2 \sum x_2^2 = \sum y \cdot x_2 \end{cases} \quad (2)$$

To determine the required values of the amounts, we will draw up a calculation Table 6.

Table 6. Estimated indicators

№	y	x_1	x_2	x_1^2	x_2^2	$y \cdot x_1$	$y \cdot x_2$	$x_1 \cdot x_2$
1	169,6	3,463	90,5	11,9924	8190,2500	587,3248	15348,8000	313,4015
2	171,8	3,462	118,5	11,9854	14042,2500	594,7716	20358,3000	410,2470
3	175,1	3,434	139,6	11,7924	19488,1600	601,2934	24443,9600	479,3864
4	182,5	3,609	195,1	13,0249	38064,0100	658,6425	35605,7500	704,1159
5	189,4	3,896	225,6	15,1788	50895,3600	737,9024	42728,6400	878,9376
Σ	888,4	17,864	769,3	63,9739	130680,0300	3179,9347	138485,4500	2786,0884

Source: compiled by authors

Thus, we obtain the following system of normal equations:

$$\begin{cases} 5a + 17{,}864b_1 + 769{,}3b_2 = 888{,}4 \\ 17{,}864a + 63{,}9739b_1 + 2786{,}0884b_2 = 3179{,}9347 \\ 769{,}3a + 2786{,}0884b_1 + 130680{,}03b_2 = 138485{,}45 \end{cases}$$

Let's solve the system of equations using Cramer's method:

$$\Delta = \begin{vmatrix} 5 & 17{,}864 & 769{,}3 \\ 17{,}864 & 63{,}9739 & 2786{,}0884 \\ 769{,}3 & 2786{,}0884 & 130680{,}03 \end{vmatrix} = 2153{,}8925,$$

$$\Delta_1 = \begin{vmatrix} 888{,}4 & 17{,}864 & 769{,}3 \\ 3179{,}9347 & 63{,}9739 & 2786{,}0884 \\ 138485{,}45 & 2786{,}0884 & 130680{,}03 \end{vmatrix} = 260798{,}801$$

$$\Delta_2 = \begin{vmatrix} 5 & 888{,}4 & 769{,}3 \\ 17{,}864 & 31799347 & 2786{,}0884 \\ 769{,}3 & 138485{,}45 & 130680{,}03 \end{vmatrix} = 23702{,}6084,$$

$$\Delta = \begin{vmatrix} 5 & 17{,}864 & 888{,}4 \\ 17{,}864 & 63{,}9739 & 3179{,}9347 \\ 769{,}3 & 2786{,}0884 & 138485{,}45 \end{vmatrix} = 241{,}9091.$$

So,

$$a = \frac{\Delta_1}{\Delta} = \frac{260798{,}801}{2153{,}8925} = 121{,}0826,$$

$$b_1 = \frac{\Delta_2}{\Delta} = \frac{23702{,}6084}{2153{,}8925} = 11{,}0045,$$

$$b_2 = \frac{\Delta_3}{\Delta} = \frac{241{,}9091}{2153{,}8925} = 0{,}1123.$$

We get the following two-factor regression equation:

$$y = 121{,}0826 + 11{,}0045\,x_1 + 0{,}1123\,x_2$$

To check the adequacy of the established dependence of the number of honey. personnel in the pharmaceutical industry on the number of medical institutions and the amount of funding, we use the correlation index. To calculate it, we will compose the following calculation Table 7.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Table 7. Estimated indicators

№	y	x_1	x_2	$\tilde{y}$	$(y - \tilde{y})^2$	$(y - \bar{y})^2$
1	169,6	3,463	90,5	169,3556	0,0597	65,2864
2	171,8	3,462	118,5	172,4893	0,4752	34,5744
3	175,1	3,434	139,6	174,5510	0,3014	6,6564
4	182,5	3,609	195,1	182,7101	0,0442	23,2324
5	189,4	3,896	225,6	189,2940	0,0112	137,3584
Σ	888,4	17,864	769,3		0,8917	267,1080

Source: compiled by authors

where $\bar{y} = \dfrac{\sum\limits_{i=1}^{n} y_i}{n} = \dfrac{888,4}{5} = 177,68$

The correlation index is equal to:

$$R = \sqrt{1 - \frac{\sum\limits_{i=1}^{n}(y - \tilde{y})^2}{\sum\limits_{i=1}^{n}(y - \bar{y})^2}} = \sqrt{1 - \frac{0,8917}{267,1080}} = 0,9983$$ indicates a very close relationship between the effective trait

and factor variables.

Let's analyze the resulting equation: an increase in the number of medical institutions by 1 unit leads to an increase in the number of honey. There are 11 personnel in the pharmaceutical industry, an increase in the volume of financing of the guaranteed volume of medical care by 1 billion tenge leads to an increase in the number of honey. personnel in the pharmaceutical industry 112 people.

Let's calculate the coefficients of elasticity:

$$Э_1 = b_1 \cdot \frac{\bar{x_1}}{\bar{y}} = 11,0045 \cdot \frac{3,5728}{177,68} = 0,2213$$, where $\bar{x_1} = \dfrac{\sum\limits_{i=1}^{n} x_{1i}}{n} = \dfrac{17,867}{5} = 3,5728$

- an increase in the number of medical institutions by 1% leads to an increase in the number of honey. personnel in the pharmaceutical industry by 0.22%;

$$Э_2 = b_2 \cdot \frac{\bar{x_2}}{\bar{y}} = 0,1123 \cdot \frac{153,86}{177,68} = 0,0973$$, where $\bar{x_2} = \dfrac{\sum\limits_{i=1}^{n} x_{2i}}{n} = \dfrac{769,3}{5} = 153,86$:

- an increase in funding by 1% leads to an increase in the number of honey. personnel in the pharmaceutical industry by 0.0973%.

Thus, the number of medical institutions has a greater influence on the number of medical personnel in the pharmaceutical industry than the amount of financing of the guaranteed volume of medical care. Comparing the two obtained regression equations, it can be noted that the volume of financing of guaranteed volume of medical care has a greater impact on the number of honey. personnel in the pharmaceutical industry than the total funding. Speaking about innovation in the pharmaceutical industry, we understand that we are talking, first of all, about modern biotechnologies used in medicine, where methods of influencing the pathological process at the level of molecules and genes are used. It has two main goals: analysis of the pathogenesis of a disease at the molecular

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

level and the production of drugs based on genetic modifications of microorganisms and body cells. Few biotech companies have managed to maintain their autonomy. Among them: Gilead, Amgen, Celgene (Table 8).

Table 8. Leaders among biotech companies that have retained independence

	Company	Country	Market value in million dollars	Turnover in 2018 in million dollars	Turnover in 2019 in million dollars	Growth in %
1.	GileadScience	USA	85 320	30 390	26 107	-14,09%
2.	Amgen	USA	111 580	22 991	25 434	10,63%
3.	Shire	Ireland	45 400	10 885	14 449	32,74%
4.	Celgene	USA	62 120	11 185	12 973	15,99%
5.	Biogen	USA	57 140	11 449	12 274	7,21%
6.	Alexion	USA	25 110	3 018	3 551	17,65%
7.	Vertex	USA	37 760	1 685	2 173	28,96%
8.	JazzPharmaceuticals	Ireland	8 840	1 488	1 619	8,80%
9.	Incyte	USA	13 190	994	1 360	36,82%
10.	Regeneron	USA	30 690	896	1 198	33,71%

Source: compiled by authors

In general, everything has led to the fact that today the biotechnological sector has come under the control of the leaders of the global pharmaceutical market. This trend is quite logical and logical, since the number of new drugs that are produced by biotechnology is increasing every year. And, of course, large companies, instead of funding expensive in-house developments, buy out the rights to biologics from small businesses as soon as they show the first promising results in clinical trials. At the same time, a 50-80% markup on the current exchange quotation is already becoming a normal phenomenon. From the above facts, we can conclude that there is an intensive consolidation process in this area, and the number of main players is decreasing.

The biotechnology market in Kazakhstan is going through a real revolution, Kazakhstani pharmaceutical manufacturers offering modern high-quality drugs pose serious competition for the players of the international large pharma. In this situation, it is extremely important to create and strengthen in the minds of representatives of target audiences a strong and reliable image of Kazakhstan pharmaceutical manufacturer.

6. Conclusion

An analysis of the volume of financing in the health care system contributes to the modernization of public medical institutions, an improvement in the quality of medical services to the population, the successful implementation of large infrastructure projects, both in the health sector and in the further development of the pharmaceutical industry.

For effective management of product innovations in the pharmaceutical industry, it is necessary to systematize the factors of innovative development of the industry, to identify problems in the market of innovative medicines, as well as opportunities for managing innovative activities of pharmaceutical enterprises. Therefore, in order to analyze the effectiveness of the management system for innovative projects in the pharmaceutical industry of the Republic of Kazakhstan, authors considered the main indicators of health care development and its financing, which affect the further development of product innovations in the pharmaceutical industry. As a result, the dependence of the number of medical personnel in the pharmaceutical industry on the number of medical institutions and the amount of funding was revealed.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

By analyzing customer preferences and applying the latest technologies, it is possible to promote products in a more targeted manner, taking into account the characteristics of each target group, which increases the efficiency of promotion costs. To do this, we need to learn new tools and master them. In this regard, authors had developed an algorithm for interrelated actions for the development and promotion of pharmaceutical products in the context of digitalization and globalization.

Thus, the growing volumes of pharmaceutical markets, high growth rates of drug prices, a shortage of certain types of drugs, the need for effective spending of budget funds and the social significance of drug markets make it necessary to conduct a thorough study and identify problems in the Kazakhstani market of innovative drugs and the reasons for their low effectiveness.

The introduction of innovations is becoming one of the priority instruments for ensuring the growth of the state economy. Innovation is an effective tool in the competition, as it definitely leads to a company of welfare, to attract inevitable investments, as well as to the formation of new effective demand.

References

Ashmarina, S., Streltsov, A., Izmailov, A., Dorozhkin, E., Vochozka, M. 2016. Organizational and Economic Directions of Competitive Recovery of Russian Pharmaceutical Enterprises. IEJME: Mathematics Education, 7(11), 2581–2591.

Bizunok, T. 2019. Analysis of the factors that determine the state and development of the global pharmaceutical industry. Military medicine, 4 (21), 99-109.

Bervelt, P., Dooren, V. 2019. Global, European and Belgian pharmaceutical market trends. IQVIA. 78 p.

Cantwell, J., Bachmann, A. 2017. Changing patterns in technological leadership - evidence from the pharmaceutical industry. International Journal of Technology Management, 4(21), 45–77. https://doi.org/10.1142/S1363919698000031

Ding, M., Eliashberg, J., Stremersch, S. 2014. Innovation and Marketing in the Pharmaceutical Industry. International Series in Quantitative Marketing, 7(11), 56-64. https://doi.org/10.1007/978-1-4614-7801-0.

Gamba, S. 2017. The effect of Intellectual Property Rights on domestic innovation in the pharmaceutical sector. World Development, 14 (99), 15–27.https://doi.org/10.1016/j.worlddev.2017.06.003

Godman, B., Hassali, M. 2017. Strategies for pricing of pharmaceuticals and generics in developing countries. Generics and Biosimilars Initiative Journal, 2(6), 58-60.https://doi.org/10.5639/gabij.2017.0602.013

Hu, J., Mossialos, E. 2016. Pharmaceutical pricing and reimbursement in China: when the whole is less than the sum of its parts. Health Policy, 5(120), 519-534. https://doi.org/10.1016/j.healthpol.2016.03.014

Ivanova, N., Mamedyarov, Z. 2019. Science and innovation: competition is growing. World Economy and International Relations, 5(63), 36-45.

Kogan, L. 2017. Technological innovation, resource allocation, and growth. The Quarterly Journal of Economics, 2(132), 665-712. https://doi.org/10.1093/qje/qjw040

Kruger, H. 2018. Access to healthcare advanced through new technology. South African Pharmaceutical and Cosmetic Review, 5(45), 32–34. http://health-sciences.nwu.ac.za/phasrec/published-articles

Kostin, K., Adams, R., Samli, C. 2015. Assessing Business Opportunities in BRIC Countries. AIMS International Journal of Management (AIJM), 3(9), 101-116.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Kaplan, W., Boskovic, N., Flanagan, D., Lalany, S., Ying Lin, Ch., Ud Din Babar, Z. 2017. Pharmaceutical policy in countries with developing healthcare systems: synthesis of country case studies. Pharmaceutical Policy in Countries with Developing Healthcare Systems. Springer International Publishing, 8 (20), 405–430. https://doi.org/110.1007/978-3- 319-51673-8_20.

Lin, A., Goncharov, V., Ivichev, E. 2016. The field of pharmaceuticals is the most high-technology part of world economy. SEI GESUND, 1(7), 23-25. https://doi.org/10.18413/2313-8971-2017-3-3-157-168

Mamedyarov, Z. 2019. Innovative development of the global pharmaceutical industry. Moscow: IMEMO RAN, 145 p. https://doi.org/10.20542/978-5-9535-0555-0

Maksimtsev, I., Karlik, A., Yakovleva, E. 2016. Modern Architecture of Global Value Chains and Value Chain Management of Russia. Proceedings of the 19th International Conference on Soft Computing and Measurements, SCM, 518-520. https://roscongress.org/materials/perspektivy-razvitiya-farmatsevticheskogo-rynka-v-stranakh-briks/

Official site of the Ministry of Health and Social Development of the Republic of Kazakhstan. 2019. https://www.statgov.kz.

Official site of the Government of the Republic of Kazakhstan. 2018. On approval of the State program for support and development of business "Business Roadmap 2020". http://adilet.zan.kz/ю

Official site of the Government of the Republic of Kazakhstan. 2014. On approval of the standards of public services provided by the Ministry of Industry and New Technologies of the Republic of Kazakhstan within the framework of the Exporter 2020 and Productivity 2020 programs. http://adilet.zan.kz/.

Official site of the Government of the Republic of Kazakhstan. 2011. "Employment Program 2020". http://adilet.zan.kz/.

Official site of the Government of the Republic of Kazakhstan. 2014. On approval of the State program of industrial and innovative development of the Republic of Kazakhstan for 2015 – 2019. http://adilet.zan.kz/.

Official site of JSC Kazakhstan Industry Development Institute (KIDI). 2019. www.sk-pharmacy.kz.

Official site of Pharmaceutical Review of Kazakhstan. 2019. www.pharm.reviews.

Official site of IQVIA Institute. 2019. The Global Use of Medicine in 2019 and Outlook to 2023 Forecasts and Areas to Watch. https://informatori.it/wp-content/uploads/2019/03/the-global-use-of-medicine-in-2019-and-outlook-to-2023.pdf

Plotnikov, V., Kuznetsova, V. 2018. The Prospects for the use of Digital Technology "Blockchain" in the Pharmaceutical Market. MATEC, 21(193), 20 - 29. https://doi.org/10.1051 / matecconf / 201819302029.

Prozherina, Y. 2019. The world pharmaceutical market: key trends. Remedium, 6(21), 30-32. https://doi.org/10.21518 / 1561-5936-2019-06-30-32.

Philippidis, A. 2017. The Top 15 Best-Selling Drugs of 2017. Romania: GEN, 231p.

Rozhnova, S., Tsypkina, A. 2017. Analysis of the system organization of pharmaceutical drug development. Drug development & registration, 17(3), 170-176. https://www.pharmjournal.ru/jour/article/view/476?locale=en_US

Rudisill, C., Vandoros, S., Antoun, J. 2014. Pharmaceutical Policy Reform in the Russian Federation. Journal of health politics, policy and law, 3(39), 691–705. https://doi.org/10.1215/03616878-2682659.

Scannell, J. 2017. Diagnosing the decline in pharmaceutical R&D efficiency. Nature reviews Drug discovery, 3 (11), 191-200. https://doi.org/10.1038/nrd3681

Schweitzer, S., Lu, Z. 2018. Pharmaceutical Economics and Policy: Perspectives, Promises, and Problems. Oxford University Press, 65 p. https://www.worldcat.org/title/pharmaceutical-economics-and-policy-perspectives-promises-and-problems/oclc/1079039281?referer=br&ht=edition

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Semin, A. 2017. State support for research in pharmacology: an analysis of foreign and domestic experience. Research Result: Pharmacology and Clinical Pharmacology, 3(3),157-168. https://doi.org/10.18413/2313-8971-2017-3-3-157-168.

Zervas, G., Proserpio, D., Byers, J. 2017. The rise of the sharing economy: Estimating the impact of Airbnb on the hotel industry. Journal of Marketing Research, 5 (54), 687–705. https://doi.org/10.1509/jmr.15.0204

Zhibek OMARKHANOVA is Candidate of Economic Sciences, Professor of S. Seifullin Kazakh Agro Technical University, Nur-Sultan, Kazakhstan.Research interests: small and medium business, innovations, investments.
ORCID ID:orcid.org/0000-0002-8015-2383

Danagul TLEUZHANOVA is Candidate of Economic Sciences, Associate Professor of S. Seifullin Kazakh Agro Technical University, Nur-Sultan, Kazakhstan. Research interests: finance, taxes, investments, budget, credit.
ORCID ID:orcid.org/0000-0001-6098-2147

Aigul ZHOLMUKHANOVA is Candidate of Economic Sciences, Associate Professor of S. Seifullin Kazakh Agro Technical University, Nur-Sultan, Kazakhstan.Research interests: small and medium business, innovations, investments.
ORCID ID:orcid.org/0000-0003-4419-5439

ZamiraMUKHAMBETOVA is Candidate of Economic Sciences, Associate Professor of S. Seifullin Kazakh Agro Technical University, Nur-Sultan, Kazakhstan. Research interests: small and medium business, innovations, investments.
ORCID ID: orcid.org/0000-0003-2385-4829

Sholpan ALPEISSOVA is Candidate of Economic Sciences of S. Seifullin Kazakh Agro Technical University, Nur-Sultan, Kazakhstan. Research interests: small and medium business, innovations, investments.
ORCID ID:orcid.org/0000-0002-3034-3165

Publisher
http://jssidoi.org/esc/home

DEBT AND INVESTMENTS: ANALYSIS OF SELECTED COUNTRIES

Talant Kaliyeva [1], Lyazzat Sembiyeva [2], Aida Zhagyparova [3], Azyk Orozonova [4], Gulzhan Tazhbenova [5], Zhanat Tulegenova [6]

[1,2,3] Gumilyov Eurasian National University, Nur-Sultan, Kazakhstan
[4] Institute of Economics Academician J. Alyshbaev of the National Academy of Sciences of the Kyrgyz Republic, Kyrgyzsatn
[5] Eurasian Humanities Institute, Nur-Sultan, Kazakhstan
[6] Turan-Astana University, Nur-Sultan, Kazakhstan

E-mails: [1] Talantkaliyeva@gmail.com; [2] sembiyeva@mail.ru; [3] Zhagyparova_Aida@mail.ru;
[4] Azyk.orozonova@gmail.com; [5] gdt_2807@mail.ru ; [6] tzhanu@mail.ru

Abstract. Starting with overview of existing approaches to meaning and use of the terms the paper focuses on analysis of two indicators vital in any economy – debt and investments. It discusses the differences of sovereign and country debts as well as internal and external debts. Public debt is important indicator for government performance evaluation but outcome and impact of total external debt should be on focus too for sustainable growth of any country. The article discusses the results of analysis conducted with regard to the gross public debt, gross external debt by sectors. Further analysis is focused on Foreign Direct Investment and External Debt stocks of the selected countries which are from developing and emerging economies. Empirical analysis of external debt and foreign direct investments of Kazakhstan is carried out as of the country which leads the list of Foreign Direct Investment related component of the external debt. We discuss the important factors to be further investigated with regard to debt management and investment policy of a country.

Keywords: external debt; foreign direct investment; investments; public debt; quasicorporations

1. Introduction

When used correctly, public debt improves the standard of living in a country. That's because it allows the government to build new roads and bridges, improve education and job training, and provide pensions. This spurs citizens to spend more now instead of saving for retirement. This spending by private citizens further boosts

economic growth. Whether a government spends on social security, health care, or others, it's pumping money into the economy. That boosts economic growth because businesses expand to meet the demand created by spending. That usually results in new jobs, which expected to have a multiplier effect in stimulating further demand and growth. As long as the sovereign debt remains within a reasonable level, creditors feel safe that this expanded growth means they will be repaid with interest.

Debt to GDP ratio is considered as an indication of how likely the country can pay off its debt. The ratio is usually related to public debt and public debt is one of sources to finance public expenditures. If the government has a shortage in public income to finance its activities experiencing a deficit of funds the solution may be a borrowing. But "public debt" may mean central government debt as well as debts of all branches of government. Moreover, depending on domestic legal jurisdiction, public debt may or may not include debts carrying a government guarantee. Analysis of any type of debt requires to make sure the definitions as they may be not the same and measured differently if called identically, for example, what is actually included in sovereign debt by the debt rating agency may not be the same as defined by the international institutions.

The ability to service a debt depends on the size of the debt, on the conditions of borrowing, the nature of the use of the loan, the prospects for the development of the borrower and the economic situation. Debt may be there in a result of investment decision, cash flow management problems and/or extraordinary events what may impact on a country's performance. Nations finance their debt through bonds or can also take on loans directly from banks, private businesses or individuals. Some also borrow from other countries. Depending on a borrower's residency the debt may be internal/domestic or external. Total gross external debt includes, as a rule, the external debts of all branches of government as well as private debt that is issued by domestic private entities under a foreign jurisdiction.

Investors drive up interest rates in return for greater risk of default. That makes the components of economic expansion, such as housing, business growth, and auto loans, more expensive. To avoid this burden, governments must be careful to find that effective "point" of public debt. It must be large enough to drive economic growth but small enough to keep interest rates low.Investment is referred to the purchase of capital goods being interchangeably called capital and meaning all manufactured aids used in producing consumer goods and services. The paper discusses the results of Gross External Debt Position analysis of 75 countries the data for which are available from "Quarterly External Debt Statistics SDDS". In addition to "External Debt-To-GDP" ranking the analysis reveals the debt position by sector – general government, central bank, deposit-taking corporations except the central bank, other sectors and Direct Investment Intercompany Lending.

Increase in government spending, which, through budget deficit, gets added to the debt contributes to a growing economy as well as foreign direct investments (FDI), which, in principle, should contribute to investment and growth in host countries.

2. Literature review

The national debt becomes a sovereign debt – debt instrument issued by a sovereign government, most sovereign debt takes the form of bonds: used interchangeably with the terms national debt, public debt – crisis when the country is unable to pay its bills. The first sign is when the country finds it can no longer get a low-interest rate from lenders. Banks worry that the country cannot afford to pay the bonds and fear a debt default they may require higher yields to offset their risk what, in its turn, may cause more costs what the country may face to

refinance its debt. The ability to pay off its debt by the nation is measured through commonly used Debt-To-GDP (Debt/GDP) ratio. The higher the ratio, the higher the risk of default what may worry investors.

Consequences of government deficits what leads, as a rule, to a borrowing and cumulatively, from year to year, becomes a "government" or "public" debt was discussed with the point of immediate consequence – paying more and more interest. Economists have traditionally argued that government borrowing, just like individual borrowing, may be justified relative to the purpose for which the money is used. By borrowing, the government places the burden of reduced consumption to future generations. Foreign indebtedness may increase, reducing future standards of living (Stiglitz, 2019; Zhao, Liu, Liu, Usman, Dutta, 2020; Mazzanti, Mazzarano, Pronti, Quatrosi, 2020).

The impact of Debt to the economy is one of matters what requires thorough analysis based on reliable data. The matter is on discussion of researchers during the last two to three decades. Debt discussion is necessarily conducted from the point of view of developed or developing countries dividing countries along economic prosperity (Bengoa, Sanchez-Robles, 2017). Debt is considered together with capital flow and impact of debt to economic growth may be assessed through its effect toinvestment, exchange rate, inflation, unemployment, etc. Some researches highlight the problems of mismanagement and relevant policieswhile others suggest that foreign direct investment is positively correlated with economic growth in the host countries (Ndubuisi, 2017). Another group of researches pointed out a critical level (or 'tipping point') when the debt may weaken GDP growth. Some studies found so-called 'tipping point', the level of Debt-To-GDP, 77% for any and 64% for developing countries, exceeding what may cost the country, 1.7 and 2 percent, respectively, in economic growth (Caner, Grennes, Koehler-Geib, 2018).

Countries of Eurozone follow the rule of critical level referring to the ratio of gross government debt to GDP not higher than 60% set by The Maastricht treaty in which "General government gross debt" is defined "as consolidated general government gross debt at nominal (face) value, outstanding at the end of the year in the following categories of government liabilities (as defined in ESA 2010): currency and deposits, debt securities and loans. The general government sector comprises the subsectors: central government, state government, local government and social security funds" (Official site of Eurostat, 2019).

The majority of EU countries satisfy The Maastricht criteria (Figure 1). Experiences of OECD countries for the period considered are worth to note: Luxemburg's public debt doubled in 2008 achieving 14,9% comparing to 7,7% in 2007, some countries – Latvia, Portugal, Slovenia, Slovak R., Spain and UK –suffered high level, 2 and more times higher than in 2007, public debts by 2014 and only few of them could manage to reduce the level. Interesting experience of two more countries – Ireland and Norway – may be learnt further: Ireland's public debt increased to 120% in 2013-2014 from 23,9% in 2007 and dropped to 76,9% in 2015 continuing to go down to date, Norway experienced decrease of public debt form 49% in 2007 to 27,4% by 2011 what kept further few years but significantly increased, more than 50%, during the last two years of the period considered.

The global composition of government bond stocks is particularly interesting where G-7 governments account for 75% of all government bonds outstanding with 55% accounted by two governments – US and Japan – while the other five 20%. As the researcher states, "Debt-to-GDP ratios continue to rise, because investors simply have nowhere else to go" and "only a handful of governments have the economic and institutional means of supplying bonds in the quantities needed to fulfil this safe haven function" (Lysandrou, 2017).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810
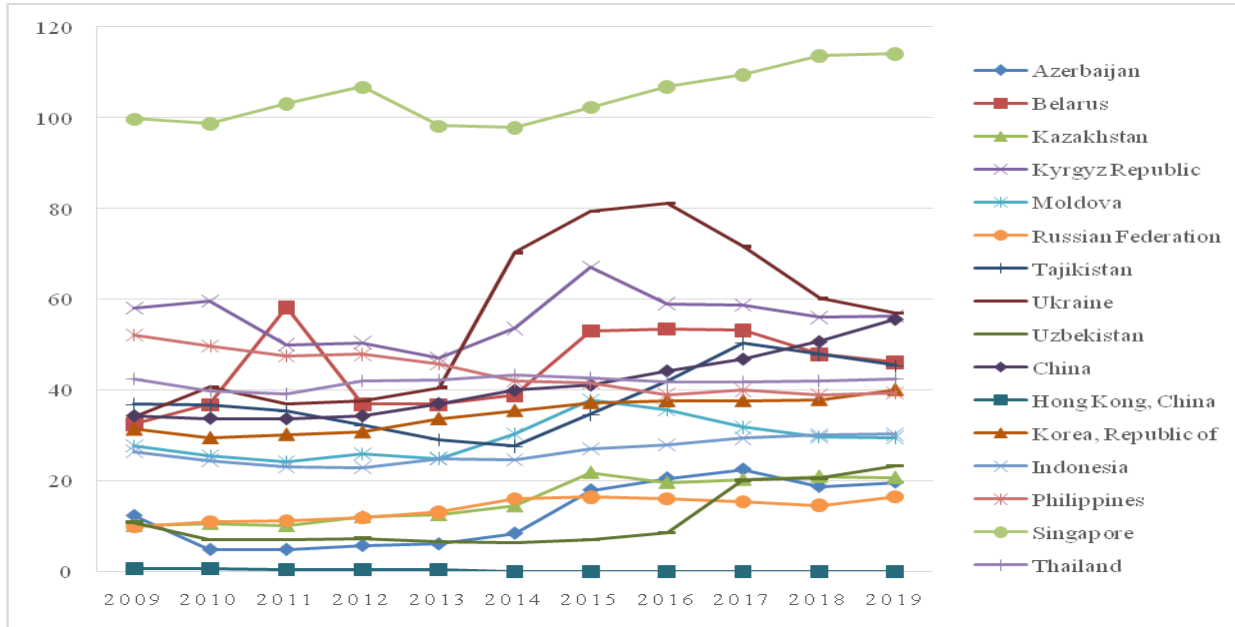
Public debts of Developing Economies and Emerging Market Economies are significantly low comparing to governments of developed countries with Singapore which is in the top of selected countries with increasing PublicDebt-To-GDP ratio in the period after 2015 reaching 112.9% in 2018.Ukraine has the highest ratio among the Emerging Market Economies countries from 2014 what may be explained by the political instability and relevant economic situation in the country. Significant increase of ratio in case of Azerbaijan and Kazakhstan is likely due to a fall in oil prices. Particularly, in Azerbaijan, the ratio achieved 48,4% being almost four times higher than in 2009 (12,4%).
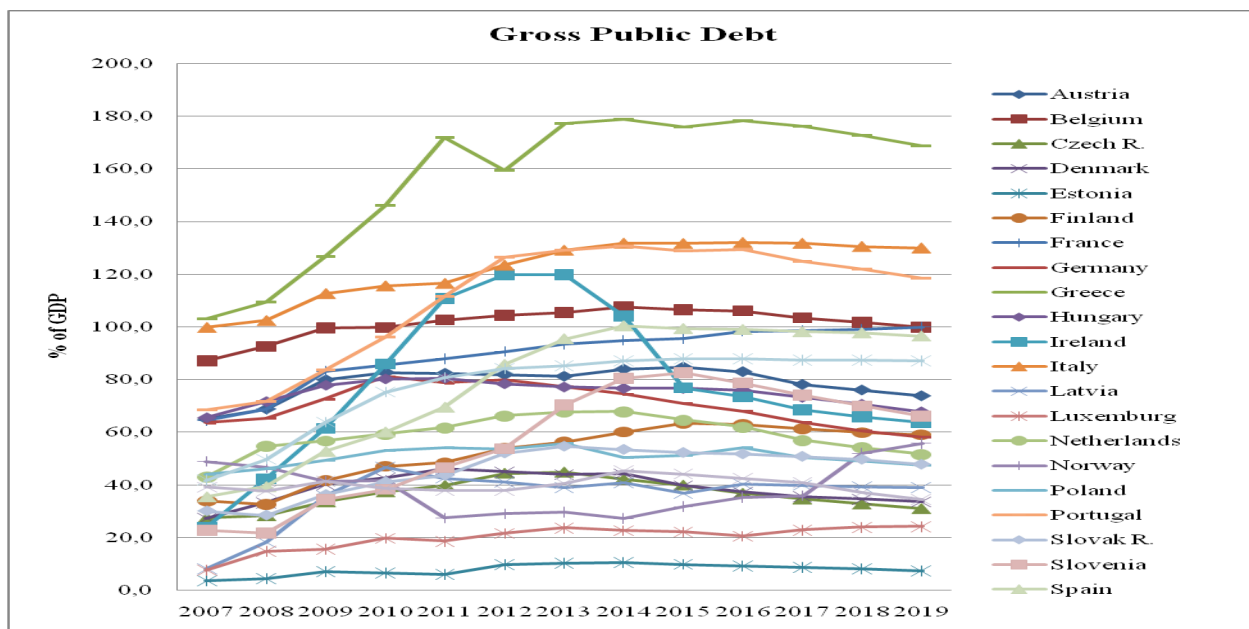
Figure 1. Gross Public Debt, OECD countries, years 2007-2019
Source: compiled by authors according to data of OECD

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Figure 2. Gross Public Debt, selected Developing Economies and Emerging Market Economies (% of GDP)
Source: compiled by authors according to data of IMF, Fiscal Monitor

Low level of public debt, comparing to OECD countries (Figure 2), characterizes the public finance situation in transition economies what may be explained by different factors from the significantly different starting point ("transition" from one system to another comparing to the countries which has a historically different economic and political situation) to the risks associated with a country's political regime.

Within the neoclassical economic paradigm, economic efficiency is the benchmark by which both market outcomes and government intervention are judged. Public borrowing within a democracy is a means by which state-based intermediation replaces market-based intermediation. This replacement might be universally beneficial or it might be beneficial to some but not to others, with the outcome depending on the institutional arrangements within which political and fiscal outcomes emerge (Jürgen, 2018).

Discussions on Debt consider the risk of triggering a crisis of confidence in the ability to repay debt, mainly focusing on "government debt". Public borrowing is significantly discussed in investigations with regard to impact of public expenditure on economic growth (Sasmal, 2018) and relationship between economic growth and other factors – investment, private and government consumption, trade openness – with a focus on sustainability of growth (Pegkas, 2018). A number of investigations attempt to assess a sustainability of the debt policy (Aviral, 2016) and a systematic long-term relationship between debt and structural primary balance (Beqiraj, 2018).

Both key words "growth" and "sustainability" of development is actively discussed in studies of the past years form several points of views, riskiness of high indebtedness with negative effect to fiscal policy and investors' perception, examination of the relationship between sovereign credit ratings and FDI inflows (Bayar, 2016), trying to understand the boundaries and effects of debt-based financing of public investments (Ari, 2018). Development of macroeconomic policies for achieveing future growth targets in long-term perspective and

relationship between growth and imbalances are considered with study of the fiscal policy issues (Akar, 2019), the effects the foreign exchange market and regulation of capital flows and "appropriate industrial policy" (Landesmann, 2018).

Some authors shed new light on the debt-growth relationship looking at the determinants of transfers and investmentin order to understand the effect of debt to an economy and suggest that there is a negative marginal relationship between debt and growth at intermediate levels of debt (Cordella, Antonio Ricci, Ruiz-Arranz, 2015). Nur Hayati Abd Rahman found that there is no mutual consensus on the relationship between public debt and economic growth referring to less studied effects of public debt on the economic growth in the upper-middle-income economies (Rahman, 2019).

The total country debt is the sum of public and private debts each of which, in its turn, is the sum of internal and external debts. Or relatively, the country's external debt may be both public and private, representing the capital flow from non-residents to public and private entities of the country.In accordance with the IMF glossary, "Gross external debt, at any given time, is the outstanding amount of those actual current, and not contingent, liabilities that require payment(s) of principal and/or interest by the debtor at some point(s) in the future and that are owed to nonresidents by residents of an economy" (Official site of IMF, 2019).

Developing countries usually seek foreign assistance such as aid, loan, investment, etc. In theory, international capital flow is expected to positively influence to the economy of recipient country which may directly or indirectly benefit through reducing cost of capital, technology transferring, promoting specialization, committing to better economic policies, etc (Bekaert, Campbell, Lundblad, 2017). But empirical research does not confirm straightforward benefits finding no or at best mixed effects reverting to the conclusion that it is not easy to find a strong and robust causal effect from financial globalization to economic growth, especially for developing countries. Some authors study the effect of legal system and institutional environment (Belgibayeva, Plekhanov, 2018). Lucio Sarno and Mark P. Taylor distinguishes four ways the broad categories of flows in the capital account: equity flows (EF), bond flows (BF), official flows (OF), commercial bank credit (BC), and foreign direct investment (FDI). They found "relatively low permanent components in EF, BF and OF, while commercial BC flows appear to contain quite large permanent components and FDI flows are almost entirely permanent" (Sarno, Taylor, 2016).

As per the glossary of IMF, Foreign Direct Investment (FDI) is defined as "the acquisition of at least ten percent of the ordinary shares or voting power in a public or private enterprise by nonresident investors. Direct investment involves a lasting interest in the management of an enterprise and includes reinvestment of profits". FDI appears to bring about a one-for-one increase in domestic investment. Highly efficient investment and a large growth response might be expected in countries with a relatively high physical and human capital stock, efficient financial markets and good legal institutions (Official site of UNCTAD, 2004). Changes in resource flows affected the share of public and publicly guaranteed debt what fell, while that of private debt increased as a consequence of financial and capital account liberalization and led to a shift from syndicated bank lending to foreign direct investment (FDI) as the major source of external financing for developing countries (Tanna, Li, De Vita, 2018). Despite the evidence presented in recent studies, other work indicates that developing countries should be cautious about taking too uncritical an attitude toward the benefits of FDI (Hausmann, Fernandez-Arias, 2017).

Hausmann and Fernández-Arias (2000) point to reasons why a high share of FDI in total capital inflows may be a sign of a host country's weakness rather than its strength. One striking feature of FDI flows is that their share in

total inflows is higher in riskier countries, with risk measured either by countries' credit ratings for sovereign (government) debt or by other indicators of country risk. There is also some evidence that its share is higher in countries where the quality of institutions is lower. One explanation is that FDI is more likely than other forms of capital flows to take place in countries with missing or inefficient markets. In such settings, foreign investors will prefer to operate directly instead of relying on local financial markets, suppliers, or legal arrangements (Official site of UNCTAD, 2009).

Less volatility of FDI comparing to other types investment flows were noted by several authors as well as the fact that FDI flows involve not only financial capital but technological, managerial and intellectual capital (Wie, 2016). The versatileimpact to and from FDI in a globalized world can be found in the works of the authorswho studied dynamics of gross capital flows across crisis types, correlation between net inflows and outflows of FDI, relationship between FDI and the home performance of firms (Prakash, 2001). The most recent studies assess the impact of FDI to the environment (Broner, Didier, Aitor Erce, Schmukler, 2016).

However, FDI may not necessarily benefit the host country: through FDI, foreign investors gain crucial inside information about the productivity of the firms under their control (Kim, Pertovsky-Nadeau, 2016). This gives them an informational advantage over "uninformed" domestic savers, whose buying of shares in domestic firms does not entail control. Taking advantage of this superior information, foreign direct investors will tend to retain high-productivity firms under their ownership and control and sell low-productivity firms to the uninformed savers. As with other adverse-selection problems of this kind, this process may lead to overinvestment by foreign direct investors. The recent work has also cast the evidence on the stability of FDI in a new light (Dirk, Procher, 2018). Though it is true that the machines are "bolted down" and, hence, difficult to move out of the host country on short notice, financial transactions can sometimes accomplish a reversal of FDI (Ah, Nguyen, 2019). For instance, the foreign subsidiary can borrow against its collateral domestically and then lend the money back to the parent company (Zhenghui, Zimei Huang, 2019). Likewise, because a significant portion of FDI is intercompany debt, the parent company can quickly recall it.Currency crisis, excessive leverage, weak institutional environment were mentioned by these researchers as reasons for caution (Demena, 2019).

Comparing the debt to GDP, as the GDP is an income for the period while the debt is the position at the specific date, is not sufficient to assess the financial position of any country while excess GDP debt is the indicator to be subject to further detailed analysis in order to understand the economic and financial situation of the country.

Evaluation of effects is usually carried out to understand the causes brought to the effects and identify the factors driving the effect. The result of evaluation can form a basis for changes in regulation and creating tools for government intervention what might cause effects in other areas of national economy. We looked at the issue from the point of short-run and long-term: do we mean one-year saying short-run or three years what is, for example, a "budget period" in Kazakhstan what the inputs and outputs form public expenditures are planned for. Then long-term definition depends on short-run period length, from one side, and the "long-term" plans and/or strategies for the next 5-10 years. Empirical study may be performed for the long period to assess the general effect of subjects under investigation and more accurate results may be achieved with detailed appropriately structured data.

Considering a number of classifications of the debt – "government debt", "public debt", "sovereign debt", "external debt" – we were interested in "external debt" meaning both public and private sectors borrowings where the lender is a non-resident. The external debt matter is one of frequently discussed questions in the countries with a rapid development what could cause an excessive debt burden from the point of a society.

1273

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

The next point what we focused on is the nature of the item to be investigated in order to correctly determine the relationship in imbalance issues. The debt is the "balance sheet" item and, consequently, accounted in the country's accounts as liabilities. The debt may be either short-term or long-term. Other effects from the debt is expenses being an "income statement" item and in- or out-flows being a "cash-flow" or "capital-flow" item. If the majority of total debt is external, i.e. related to non-residents, it might become the country dependent on the economic and financial position of another country and/or countries.

FDI, by its definition, is another "balance sheet" item being accounted as an asset and depending on its size ("10%", "49%" or even "100%") and on scale of activity its effect might be very significant to the industry and/or even to the national economy. Effect from FDI to the economy is production of goods/services being a part of GDP. Foreign investors may finance the activity by means of investments into shares of the company or by the debt instrument where the borrower is FDI with any counterpart. If the counterpart is a non-resident it brings to "outflows" of cash and might have an effect to financial policy of the country. Discussions on FDI is more meaningful if to focus on "gross" and "net" (or, "inflows" and "outflows"). But the flows may be related to both FDI to the country and FDI from the country.

Our study is about the economy sectors' share in the external debt of a country with comparing the external debt with FDI flows empirically testing the FDI flows to the country and its relationship to the country's external debt.

3. Data and methodology

Preliminary analysis of "Data from database: Quarterly External Debt Statistics SDDS" of 74 countries as of the end "2018Q4" last updated 07/31/2019 (Table 1 - Gross External Debt Position by Sector (USD millions) reveals Luxemburg at the top of the list of ExternalDebt/GDP (%) list with the debt almost 60 times higher than its GDP (see Annex 1). West Bank and Gaza is in the bottom of the list with 9.7% ExternalDebt/GDP ratio.

Table 1. Gross External Debt Position by Sector

External Debt position	General Government	Central Bank (CB)	Deposit-Taking Corp., exc. CB	Other Sectors	DI: Intercom Lending	total
mln USD	17 535 699	4 421 087	25 176 987	23 416 413	12 006 267	82 556 453
% oftotalExternal Debt	21,2%	5,4%	30,5%	28,4%	14,5%	100,0%
min	0,2%	0,01%	0,04%	3,0%	1,6%	
max	77,0%	32,6%	66,7%	54,6%	63,6%	

Source: compiled by authors according to Eurostat

As given in the table 1 provide above, "Other Sectors" and "Deposit-taking corporations excluding Central Bank" accounts for about 60% of the total external debt. It should be noted that, "general Government is defined as "All government units and all nonmarket, nonprofit institutions that are controlled and mainly financed by government units comprising the central, state, and local governments; includes social security funds and does not include public corporations or quasicorporations. While the definition of "Other sectors" might be not straightforward, we believe that the external debt of "public corporations or quasicorporations" is accounted under this label. The debt related to FDI is accounted as a part of external debt and due to payment to non-residents.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Further analysis of details of each country's position demonstrates "the leaders" for each section. Ecuador's government sector is the main borrower of debt from non-residents with 77% of the country's total external debt. Slovak Republic's Central Bank leads the list of central banks who relies on the non-residents' funds. Deposit-taking corporations of Denmark is the most active sector in the country in attracting funds from abroad. Ireland's "Other sectors" owe to non-residents 54.6% of the country's total external debt. Finally, Kazakhstan's external debt is mostly – 63,6% of the country's total – related to FDI despite of significant difference between gross and net FDI inflows. The details of inflows for the period 2013-2019 is given in the Table 2 in accordance with the country's official statistics.

Table 2. Kazakhstan: Gross and net FDI inflows

mln USD	2013	2014	2015	2016	2017	2018	2019
Gross inflow of direct investment	24 098	23 809	15 368	21 367	20 960	24 276	24 114
Net inflow of direct investment	10 321	8 489	4 057	8 511	4 669	3 817	3 118
difference (Gross-Net), calculated	13 777	15 320	11 311	12 855	16 291	20 459	20 996

Source: compiled by authors

Comparative analysis of two indicators – External Debt stock and FDI stock – was conducted in order to understand their correlation and graphically presented below. Both indicators are given as per the World Bank data except to Azerbaijan and some Central Asian countries – Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan – external debt stock of which are referred to publicly available unofficial sourcesdue to lack of official disclosure.
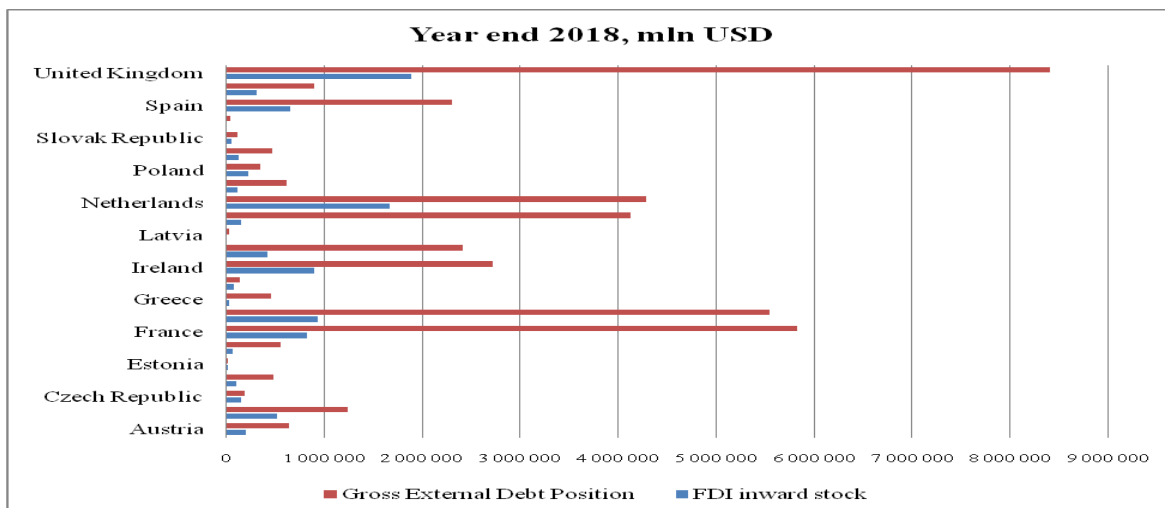
Figure 3a. Developed economies: FDI and External Debt stocks of selected countries
Source: compiled by authors according to Eurostat

World FDI inflows tend to decrease from 2015 to date with a dominant position of developed economies in investments to other countries. In order to investigate a relationship between FDI flows and debt the gross

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

amounts would be relevant to use.Due to shortage of time series data on external debt position of developed countries further analysis was not carried out. In case of developed countries, FDI stock is not a major component of external debt.

As of the end of 2018, selected developing economies external debt position is insignificant being in total less than the UK external debt.In the meantime, comparison of two figures – 3a) for developed economies and 3b) for developing countries – reveals an obvious difference in relationship of the FDI and external debt stock. Unlike developed countries, developing countries are interested in attracting foreign investment. A certain relationship between the FDI and external debt stock of developing economies may be there due to attractiveness of these countries for investors who expect higher returns as a reward for higher risks.
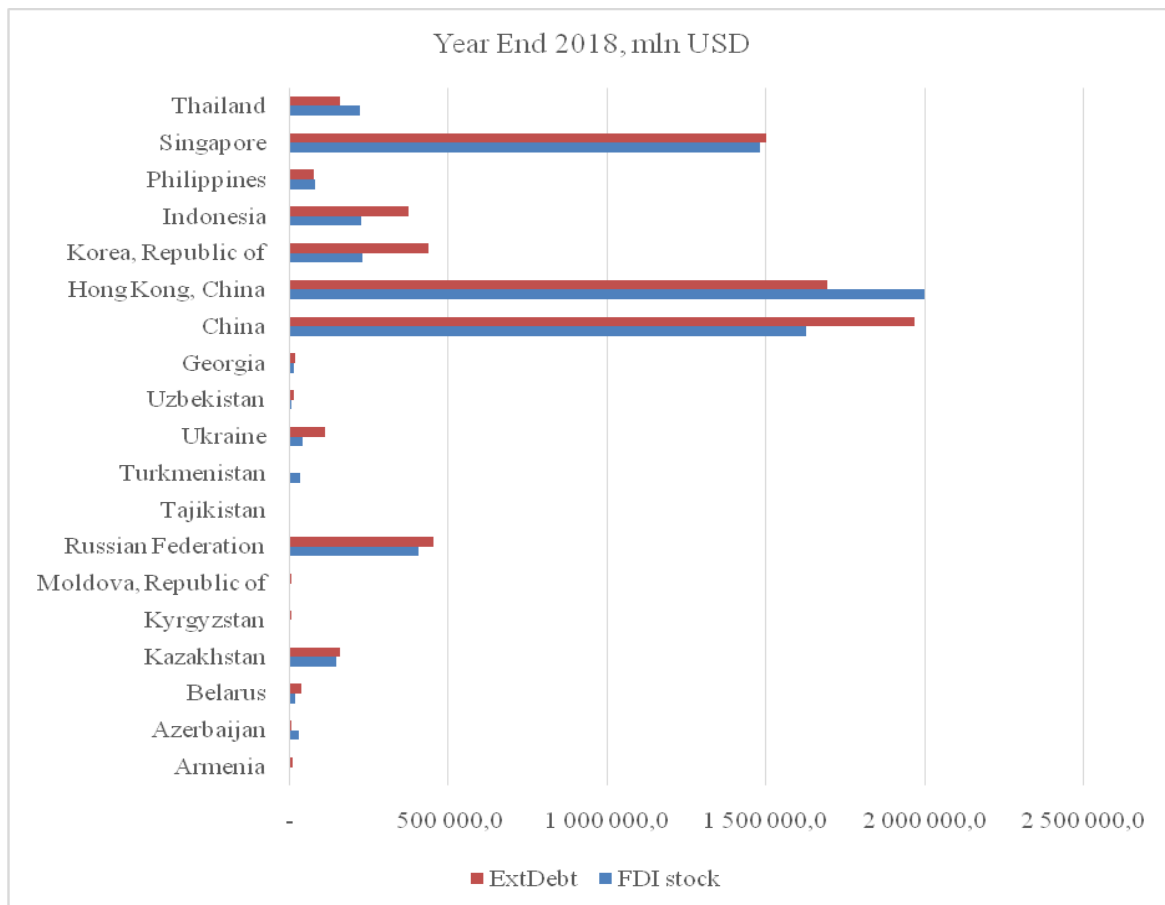
Figure 3b. Developing economies: FDI inward and Gross External Debt stocks of selected countries
Source: compiled by authors according to Eurostat

Time series data on External debt limited to the available data from "External debt stocks (% of GNI), World Development Indicators, Last updated 01.07.2020" is given for comparison purposes assuming the insignificant differences between GDP and GNI of the countries under analysis. Few developing countries like Hong Kong, Korea Republic and Singapore were not analyzed as there is no relevant data. Graphical method of analysis is given in the Figure 4.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810
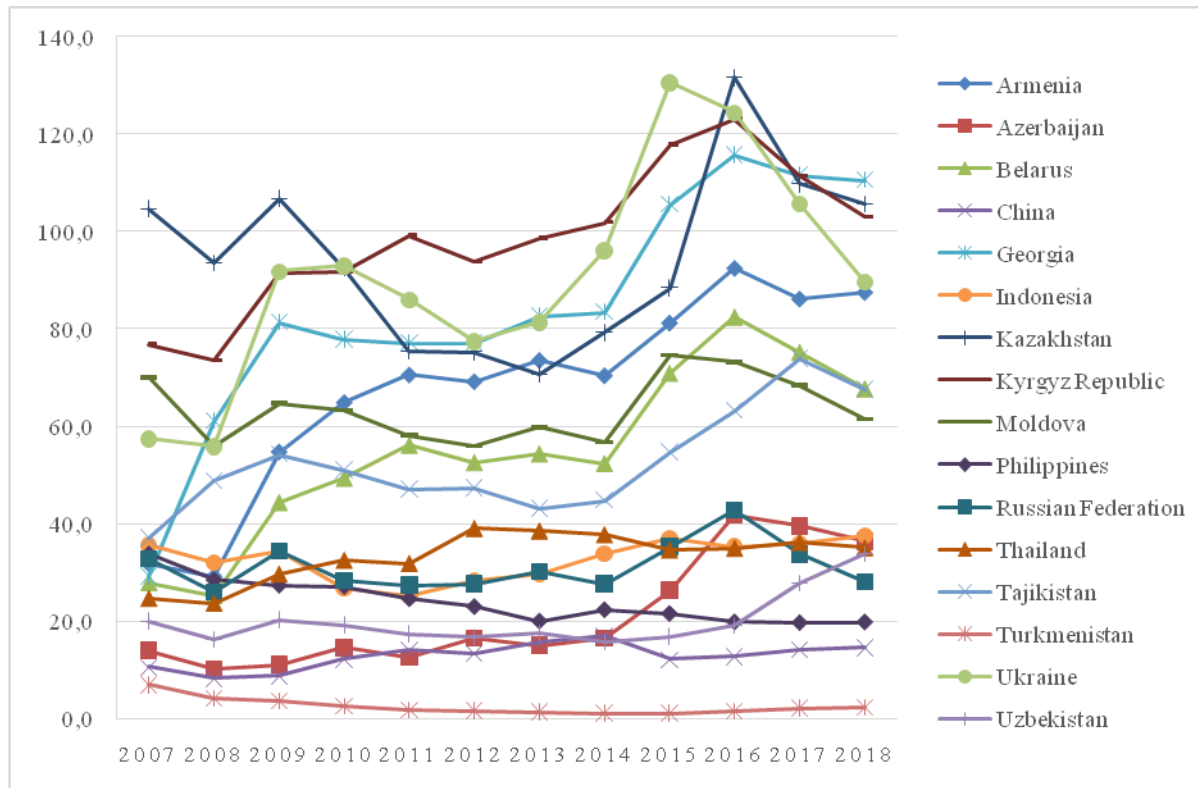
Figure 4. External debt stocks (% of GNI), years 2007-2018
Source: compiled by authors according to data of OECD

The figure approximately represents the trend for a given period and countries as the Gross National Income (GNI) of the countries is nearly of their GDP. According to data of the World Bank Group, Annex 1 – Gross External Debt Position by Sector, some countries – Luxembourg, Ireland, Malta – appear at the very top of the list as of the 2018 year end with the highest External Debt-to-GDP ratio.
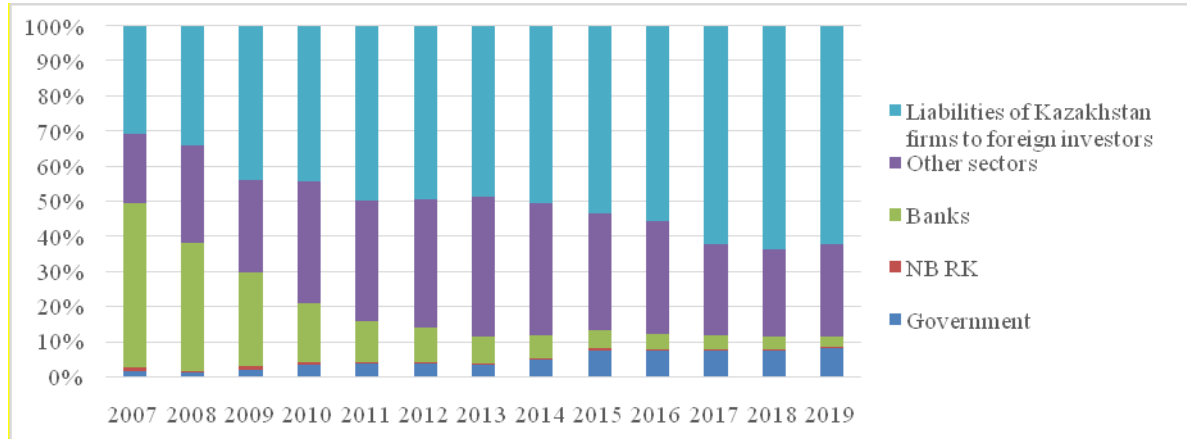
Figure 5. Kazakhstan: External Debt structure by borrowers
Source: compiled by authors according to data of National Bank of the Republic of Kazakhstan https://nationalbank.kz/en

Debt means extra, interest, expenses, what could be compared to the return on investments if the debt is due to investment policy. The country's capacity to repay a debt may depend on a total – public and private – (external) debt burden. If the private external debt is significant and, consequently, the businesses profit goes down due to high interest expenses the government may decide on intervention. This fact is especially important in the countries like Kazakhstan where there are big government business enterprises. To the date the country's external debt to GDP is 93% about 1/3 of which is the external debt of, mainly, state-owned enterprises while more than 60% is "liabilities of local firms to foreign investors and related (foreign) parties", i.e. due to FDI as noted above.

According to Figure 5, graphical method of external debt analysis of the Republic of Kazakhstan demonstrates some risks mentioned above with regard to FDI being increased from 31,0% in 2007 to 62,1% in 2019 of the total external debt.

4. Empirical results

Referring to the fact of leadership of Kazakhstan in FDI sector the external debt and FDI stock regression analysis was the subject of the empirical study with 23 of observations considering the dependence of external debt growth on FDI.

Assuming that FDI flows influence growth of external debt, the dependence may be expressed as Y = a+bx, where External debt is denoted by 'y' and FDI inflows is by 'x'. The result of the study gives an overall impact of FDI and dependent on other factors influencing external debt.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Regression Statistics	
Multiple R	0,946893694
R_Square	0,896607668
Adjusted R_Square	0,891438052
Standard Error	20,24014668
Observations	22

ANOVA

	df	SS	MS	F	Significance F
Regression	1	71051,2014	71051,2014	173,4379	2,58423E-11
Residual	20	8193,2708	409,6635		
Total	21	79244,4721			

	Coefficients	Standard error	t-stat	P-value	Lower 95%	Upper 95%
Y-Intercept	22,20	6,4991	3,4160	0,0027	8,6442	35,7580
Variable X 1	0,54	0,0407	13,1696	0,0000	0,4506	0,6202

Referring to the coefficient of determination R_Square = 0.897 the external debt change may be explained by the amount of FDI inflows while it depend on other factors as well.

The result of further correlation analysis is graphically presented in Figure 6 with the regression equation derived as y = 22,2 + 0,54x
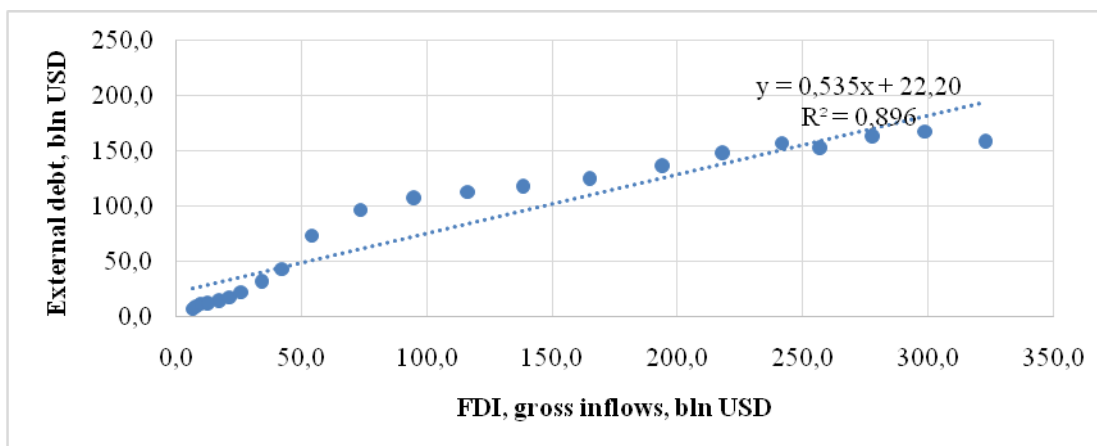
Figure 6. Correlation-regeression analysis of FDI and External Debt
Source: compiled by authors

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

As FDI net inflows is less relevant to Debt we decide to use FDI gross inflows. Indeed, the difference between gross and net FDI inflows is considerable (see Table 2 above) emphasizing the nature of the FDI flow rather than the FDI stock/asset.

We conducted some further investigation into the FDI details as the gross FDI comprises both equity and loan components. The matter is important for evaluation of the FDI effect to the GDP growth through the investments into main capital. Results of the investigation will be presented in coming papers after thorough analysis of appropriate data and relevant information.

5. Conclusion

External debt burden is subject to further analysis depending on the borrower and lender as well as maturity and other terms. For the thorough analysis of the external debt impact to economy the countries' data should be carefully selected with the clear borders of the public and private sectors as well as with the internal and external components of the debt.Then Debt as "flow of money" not in any way belonging to capital or any other contribution could be compared to "capital flow", i.e. investments for assessment of its impact to economy.

Foreign direct investment may contribute to growth if it is an economic investment. If the potential risks – reversal through financial transactions; adverse selection and fire sales; excessive leverage; loss of domestic competition – are managed well then "flow" is transformed into "asset", and the real contribution to economy of "asset" may be assessed depending on the investment return. The assessment may be carried out on the basis of investment by investment analysis considering both economic and social benefits.

Further research in this regard may concern the investments into main capital. An increasing debt may dampen growth over the long term as debt holders may demand larger interest payments as a compensation for an increasing risk that they won't be repaid. Therefore the issue of investment into main capital is vital in public spending as well as in foreign investor's activity. Economically beneficial investments made with care on social and environmental aspects of an activity may bring to sustainable growth thereby justifying the efforts of government and/or investors. Adding value to the business should be on focus in foreign investment analysis. Foreign investors who try to dispose of unprofitable portions of the business or use the company's collateral to get low-cost loans will not add economic value. Economic value added may be assessed by study of reinvestment policy, when earnings in host country work for expansion instead of lending the funds back to the parent company.

One of important matters for further investigation is well-defined border between private and quasi corporations what certainly affects the public debt position. The matter is whether the debt of quasicorporation should be treated as public. As the assets of corporations with a full or controlling ownership of government are public, the liabilities could be treated public as well.

Policy recommendations for developing countries should focus on improving the investment climate for all kinds of capital, domestic as well as foreign. Referring to the analysis provided above we conclude that the majority of developing and emerging economies are dependent on FDI what may directly impact the external debt of the country. The external debt indicator matters to any economy, to be it public or private, due to fiscal and monetary impacts.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

References

Ah, T., Nguyen, H. 2019. The Impact of Foreign Direct Investment on Environment Degradation: Evidence from Emerging Markets in Asia. Int J Environ Res Public Health, 16(9), 1636-1649. https://doi.org/10.3390/ijerph16091636

Akar, S. 2019. Testing the fiscal fatigue phenomenon in Turkey using a long-run non-linear fiscal reaction function approach, Department of Public Finance, FEAS. Qualitative Finance and Economics, 3(4), 645-660. https://doi.org/10.3934/QFE.2019.4.645

Ari, I. 2018. Sustainable Financing for Sustainable Development: Understanding the Interrelations between Public Investment and Sovereign Debt Division of Sustainable Development. Sustainability, 10(39), 225-236. https://doi.org/10.3390/su10113901

Aviral, K. 2016. The Behaviour of US and UK Public Debt: Further Evidence Based on Time Varying Parameters. Journal Transition Studies Review, 1(23), 778-785. https://doi.org/10.14665/1614-4007-23-1-002

Bayar, Y. 2016. Effects of Sovereign Credit Ratings on Foreign Direct Investment Inflows: Evidence from Turkey. Journal of Applied Finance & Banking, 4(2), 91-109.

Bekaert, G., Campbell, R., Lundblad, C. 2017. Does financial liberalization spur growth. Journal of Financial Economics, 77(34), 3-55. https://doi.org/10.1016/j.jfineco.2004.05.007

Belgibayeva, A., Plekhanov, A. 2018. Does corruption matter for sources of foreign direct investment, European Bank for Reconstruction and Development, 12(25), 616-627. https://doi.org/10.1007/s10290-019-00354-1

Bengoa, M., Sanchez-Robles, B. 2017. Foreign direct investment, economic freedom and growth: new evidence from Latin America, European Journal of Political Economy, 19(23), 529-545. https://doi.org/10.1016/S0176-2680(03)00011-9

Beqiraj, E. 2018. Public debt sustainability: An empirical study on OECD countries, Journal of Macroeconomics, Elsevier, 10(16), 852-864. https://doi.org/10.1016/j.jmacro.2018.10.002

Broner, F., Didier, T., Aitor Erce, F., Schmukler, S. 2016. Gross capital flows: Dynamics and crises. Journal of Monetary Economics, 12(60), 113-133. https://doi.org/10.1016/j.jmoneco.2012.12.004

Caner, M., Grennes, Th., Koehler-Geib, F. 2018. Finding the Tipping Point—When Sovereign Debt Turns Bad. The World Bank Latin America and the Carribean Region Economic Policy Sector, 8(12), 510-517.

Cordella, T., Antonio Ricci, L., Ruiz-Arranz, M. 2015. Debt Overhang or Debt Irrelevance? Revisiting the Debt-Growth Link, IMF Working Paper, 313-318. https://doi.org/10.5089/9781451862423.001

Demena, S. 2019. The effect of FDI on environmental emissions: Evidence from a meta-analysis, Energy Policy, 10(19), 77-89. https://doi.org/10.1016/j.enpol.2019.111192

Dirk, E., Procher, V. 2018. Home Firm Performance after Foreign Investments and Divestitures. Ruhr economic papers, 72(193), 1122-1129.

Hausmann, R., Fernández-Arias, E. 2017. Foreign Direct Investment: Good Cholesterol? Inter-American Development Bank Working Paper. Washington. 210-227 pp.

Jürgen, G. 2018. Handbook of Public Finance. Backhaus University of Erfurt and Richard E. Wagner George Mason University. Kluwer Academic Publishers, 331 p.

Kim, N., Petrosky-Nadeau, N. 2016. Gross Flows of Foreign Direct Investment, Ruhr economic papers, 33(41), 23-29.

Landesmann, M., Stöllinger, R. 2018. Structural change, trade and global production networks: An'appropriate industrial policy' for peripheral and catching-up economies, The Vienna Institute for International Economic Studies, 15(33), 566-578. https://doi.org/10.1016/j.strueco.2018.04.001

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Lysandrou, Ph. 2017. Debt Intolerance and the 90% Debt Threshold: Two Impossibility Theorems, London Metropolitan University, 36 p. https://doi.org/10.1080/03085147.2012.760346

Mazzanti, M., Mazzarano, M., Pronti, A., Quatrosi, M. 2020. Fiscal policies, public investments and wellbeing: mapping the evolution of the EU. Insights into Regional Development, 2(4), 725-749. http://doi.org/10.9770/IRD.2020.2.4(1)

Ndubuisi, P. 2017. Analysis of the Impact of External Debt on Economic Growth in an Emerging Economy: Evidence from Nigeria, 32(45), 819-831. https://doi.org/10.4314/afrrev.v11i4.13

Official site of IMF. 2019. https://www.imf.org/external/np/exr/glossary/showTerm.asp#89

Official site of OECD. 2019. https://www.oecd.org/

Official site of the Eurostat. 2019. https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=teina225&plugin=1

Official site of UNCTAD. 2004. External finance, debt and foreign direct investment. UNCTAD publication. https://unctad.org/en/Docs/gdscsir20041c2_en.pdf

Official site of UNCTAD. 2009. Assessing the impact of the current financial and economic crisis on global FDI flows. https://unctad.org/en/pages/publications/FDI-and-Development-(Series).aspx

Official site of National bank of the Republic of Kazakhstan. 2019. www.nationalbank.kz

Pegkas, P. 2018. The Effect of Government Debt and Other Determinants on Economic Growth: The Greek Experience. Economies, 6(10), 321-334. https://doi.org/10.3390/economies6010010

Prakash, L. 2001. How Beneficial Is Foreign Direct Investment for Developing Countries? Journal of Monetary Economics, 1(9), 21-30.

Rahman, N.H.A., Ismail, S., & Ridzuan, A.R. (2019). How does public debt affect economic growth. A systematic review. Cogent Business & Management, 6(1), 1701339 https://doi.org/10.1080/23311975.2019.1701339

Sarno, L., Taylor, M. 2016. Hot money, accounting labels and the permanence of capital flows to developing countries: an empirical investigation. UK, 414 p. https://doi.org/10.1016/S0304-3878(99)00016-4

Sasmal, J., Sasmal, R. 2018. Public Debt, Economic Growth and Fiscal Balance: Alternative Measures of Sustainability in the Indian Context, 48(12), 877-894. https://doi.org/10.1177/0972150918778940

Stiglitz, J. 2019. Economics of the Public Sector. W.W, Norton & company, Inc. 219 p.

Tanna, S., Li, C., De Vita, G. 2018. The role of external debt in the foreign direct investment– growth relationship. International Journal of Finance & Economics, 11(32), 231-240. https://doi.org/10.1002/ijfe.1628

Wie, Sh. 2016. International Capital Flows. Prepared for the New Palgrave Dictionary of Economics, UK, 318 p.

Zhao, Y.L., Liu, F.Y., Liu, C.Y., Usman, M. Dutta, K.D. 2020. Readability of Annual Report and Inefficient Investment: Evidence from Debt Financing. Transformations in Business & Economics, Vol. 19, No 1(49), 166-190.

Zhenghui, L., Zimei Huang, D. 2019. Impact of Foreign Direct Investment on Environmental Performance, Licensee MDPI, 22(31), 56-67. https://doi.org/10.3390/su11133538

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Annex 1. The list of countries considered with regard to the Gross External Debt position by Sector

2018 Q4, USD millions	General Government	Central Bank	Deposit-Taking Corp., exc. CB	Other Sectors	DI: Intercom Lending	Total
Argentina	173 584	23 746	5 650	51 217	23 735	277 932
Armenia	5 089	679	2 511	844	1 791	10 914
Australia	238 061	5 902	667 004	368 822	205 480	1 485 269
Austria	245 106	60 852	186 082	98 547	56 743	647 330
Belarus	17 410	795	4 912	13 912	2 016	39 045
Belgium	310 349	80 806	339 670	181 845	332 215	1 244 885
Brazil	174 858	4 113	102 272	145 930	238 605	665 778
Bulgaria	6 355	850	5 270	12 172	14 380	39 027
Canada	344 198	453	813 207	646 189	175 444	1 979 491
Chile	23 046	1 484	28 623	75 268	56 019	184 440
China	232 268	29 581	898 747	592 275	212 343	1 965 214
Colombia	50 617	1 099	17 259	44 774	18 276	132 025
CostaRica	7 960	1 264	6 262	5 393	7 813	28 692
Croatia	15 635	1 898	4 664	15 256	7 015	44 468
Cyprus	18 449	579	17 792	53 437	27 143	117 400
Czech Republic	31 203	7 892	78 965	35 923	39 885	193 868
Denmark	36 173	2 670	324 899	73 510	49 814	487 066
Ecuador	33 963	403	16	9 701	0	44 083
Egypt, Arab Rep.	48 070	28 269	7 693	12 579	0	96 611
ElSalvador	8 664	572	1 896	4 257	1 272	16 661
Estonia	1 722	1 777	6 191	7 718	5 320	22 728
Euroarea	2 541 670	1 161 130	4 810 199	3 914 501	3 664 631	16 092 131
Finland	109 004	15 539	321 710	62 492	58 759	567 504
France	1 443 407	349 564	2 794 819	763 655	477 636	5 829 081
Georgia	5 383	369	4 275	5 411	2 380	17 818
Germany	1 202 136	876 856	1 686 639	776 703	998 218	5 540 552
Greece	341 582	32 905	49 409	28 940	9 606	462 442
Hong Kong SAR, China	3 356	452	1 062 504	364 912	261 093	1 692 317
Hungary	41 866	1 775	19 846	21 949	63 272	148 708
Iceland	2 145	391	5 824	6 404	4 814	19 578
India	104 672	223	153 170	263 009	0	521 074
Indonesia	183 197	3 078	34 451	156 872	0	377 598
Ireland	153 969	20 894	272 661	1 488 120	790 605	2 726 249
Israel	32 800	3 699	12 871	35 763	8 663	93 796
Italy	807 938	567 156	503 249	376 880	164 826	2 420 049
Japan	1 381 604	226 824	1 367 162	974 449	62 551	4 012 590
Jordan	14 124	3 093	10 380	3 716	0	31 313
Kazakhstan	11 555	770	5 752	39 650	101 060	158 787
Korea, Rep.	84 471	27 987	190 562	107 944	29 634	440 598
Latvia	9 849	9 372	6 697	10 284	4 711	40 913
Lithuania	15 235	10 747	4 300	6 380	3 870	40 532
Luxembourg	6 621	140 318	462 682	1 781 750	1 739 681	4 131 052
North Macedonia	3 233	91	651	2 657	2 424	9 056
Malaysia	43 215	3 079	85 381	91 808	..	223 483
Malta	919	787	21 392	25 650	56 306	105 054
Mauritius	1 211	16	8 977	92 527	128 901	231 632
Mexico	197 008	6 402	32 379	212 422	0	448 211
Moldova	1 706	218	386	3 079	1 913	7 302
Morocco	15 589	1 108	1 385	27 558	5 922	51 562
Netherlands	209 281	136 526	1 164 925	1 308 027	1 471 714	4 290 473
NewZealand	35 297	31	98 024	26 567	28 135	188 054
Norway	81 998	3 630	367 746	99 888	72 007	625 269
Peru	16 201	1 012	13 150	36 334	0	66 697
Philippines	33 372	1 319	21 353	19 318	3 597	78 959
Poland	129 904	12 577	55 907	65 980	95 369	359 737
Portugal	157 086	126 876	71 549	59 321	57 785	472 617

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Romania	39 895	1 374	10 345	25 776	36 443	113 833
Russian Federation	43 955	11 880	80 193	177 974	140 678	454 680
Seychelles	406	51	105	1 828	2 684	5 074
Singapore	0	1 038	997 349	291 507	209 221	1 499 115
Slovak Republic	31 730	38 101	11 013	14 376	21 833	117 053
Slovenia	23 731	4 077	3 829	12 469	4 536	48 642
SouthAfrica	66 385	799	30 438	46 549	28 213	172 384
Spain	685 784	558 947	489 785	321 073	251 779	2 307 368
SriLanka	32 009	1 975	7 359	6 562	4 406	52 311
Sweden	69 087	3 361	555 418	115 991	158 142	901 999
Switzerland	30 899	120 697	709 364	484 687	510 132	1 855 779
Thailand	30 922	4 769	36 812	71 118	17 271	160 892
Tunisia	18 405	2 443	5 534	8 677	0	35 059
Turkey	94 544	5 922	164 179	165 690	14 480	444 815
Ukraine	40 128	7 938	5 797	51 433	9 414	114 710
United Kingdom	822 161	36 615	4 693 743	2 137 106	716 690	8 406 315
United States	6 584 373	779 198	2 939 759	7 680 042	1 686 050	19 669 422
Uruguay	16 651	534	3 795	7 525	13 490	41 995
West Bank and Gaza	920	0	417	42	44	1 423
Total:	17 535 699	4 421 087	25 176 987	23 416 413	12 006 267	82 556 453

Talant KALIYEVA is PhD student of L.N. Gumilyov Eurasian National University, Nur-Sultan, Kazakhstan.
Research interests: small and medium business, innovations, investments, .
ORCID ID: orcid.org/0000-0003-4519-0402

Lyazzat SEMBIYEVA is Doctor of Economic Sciences, Professor of L.N. Gumilyov Eurasian National University, Nur-Sultan, Kazakhstan. Research interests: finance, taxes, investments, budget, credit.
ORCID ID: orcid.org/0000-0001-7926-0443

Aida ZHAGYPAROVA is Candidate of Economic Sciences, Professor of L.N. Gumilyov Eurasian National University, Nur-Sultan, Kazakhstan. Research interests: small and medium business, innovations, investments.
ORCID ID: orcid.org/0000-0002-6624-6025

Azyk OROZONOVA is Candidate of Economic Sciences, Professor of Institute of Economics Academician J. Alyshbaev of the National Academy of Sciences of the Kyrgyz Republic Research interests: small and medium business, innovations, investments.
ORCID ID: orcid.org/0000-0001-6877-7674

Gulzhan TAZHBENOVA is Candidate of Economic Sciences, Associate Professor of Eurasian Humanities Institute, Nur-Sultan (Astana), Kazakhstan. Research interests: small and medium business, innovations, investments.
ORCID ID: orcid.org/0000-0001-7134-2794

Zhanat TULEGENOVA is Candidate of Economic Sciences, Professor of Turan-Astana University, Nur-Sultan, Kazakhstan. Research interests: small and medium business, innovations, investments.
ORCID ID: orcid.org/0000-0003-0426-9368

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

_____

INNOVATIVE POTENTIAL OF SMALL AND MEDIUM BUSINESS [*]

Almira Kulmaganbetova [1], Igor Dubina [2], Zhibek Rakhmetulina [3], Elvira Tlessova [4], Zhanat Tulegenova [5]

[1,3,4] Gumilyov Eurasian National University, Nur-Sultan, Kazakhstan
[2] Novosibirsk State University, Novosibirsk, Russian Federation
[5] Turan-Astana University, Nur-Sultan, Kazakhstan

E-mails:[1] kulalmira@mail.ru; [2] igor_dubina@yahoo.com; [3] rahmetulina_zh@mail.ru; [4] t.ilvira@mail.ru; [5]tzhanu@mail.ru

Abstract. The article presents the results of the practical implementation of the methodology for assessing the innovative potential of small and medium-sized businesses of the Republic of Kazakhstan. To identify the level of development of innovative activity of SMEs in Kazakhstan the methods of correlation and regression analysis were implemented. The analysis conducted on the basis of available statistical materials discloses the impact of different factors on the innovative potential of small and medium-sized businesses. According to the author's approach to the evaluation of innovative potential, there are three groups of factors affecting the innovative potential – factors of general economic development, factors of development of small and medium-sized businesses and factors of development of research activities. The article also analyzes the main indicators of innovation activity of the considered enterprises and institutional features of their development. The results of the research allowed to identify both the advantages and disadvantages of innovative activity of national SMEs.

Keywords: innovative potential; innovative activity; small and medium-sized business; correlation method; statistical analysis; regression analysis

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

1. Introduction

In all developed countries of the world, small and medium-sized entrepreneurship (SME) is a powerful engine of innovative development. SME is often the main subject of innovation, being the source and generator of new ideas and innovations. This is facilitated by characteristic features of small and medium-sized businesses such as flexibility in relation to the constantly changing conditions of the external environment, high mobility of resources, efficiency and return of financial resources and a propensity for risk.

In recent decades, research has shown that innovation is a key factor in improving the competitive position of firms. Their innovative ability significantly affects competitiveness, which is based on qualitatively new skills and abilities. The innovation potential for achieving much higher competitiveness means providing less expensive products and services of better quality than those provided by competitors. Therefore, the measurement of innovation potential remains one of the main problems studied by scientists, senior and middle managers.

Particularly for small and medium-sized enterprises, the adoption of best practices in innovation management has played a fundamental role in the growth and progress of these firms, creating new sources of competitive advantages compared to their competitors. Since there are many approaches and methods for researching innovative activities and innovation potential of small and medium-sized enterprises, it is necessary to build the logic of research of the development problem of small and medium-sized enterprises' innovation potential.

2. Literature review

In order to disclose the nature of the given problem and the validity of the studies, an important stage is to review the literature and analyze various view points regarding the concept of "innovation potential of small and medium-sized enterprises". A significant contribution to the development of the modern theory of innovation introduced by Rosenbusch, Brinckmann, Bausch (2011), Dewangan, Godse (2017), Cocca, Alberti (2018), Carpinetti, Gerolamo, Cardoza, Galdamez (2017), Calantone, Cavusgil, Zhao (2018), Xiong, Ye, Wang (2019), Kumar (2019), Mazzoni, (2020) and others who have elaborated on theory of innovative management. The problem of the innovation potential of small and medium-sized enterprises was studied by scientists Zawislak (2018), Hoq, Ha (2019), Maravelakis, Bilalis, Antoniadis, Jones, Moustakis (2016), Manjon, Mompo, Redoli (2016), Leskovar, Baggia, Metlikovič (2018) and others.

The works of scientists Baizholova (2014), Ismailova (2016), Kenzhebayeva (2014), Kurmanov (2015) are devoted to the problem of formation of innovative potential, as well as the assessment of the impact of various factors on its development.

According to the definition of Zawislak (2018) "innovation opportunity" is defined as a process of studying technology, turning into technological development and operational capabilities, and management and transactional procedures.

Moreover, the approach of Hoq, Ha (2019) is also interesting in terms of innovation efficiency for small and medium-sized businesses, according to which the innovation potential of small and medium-sized enterprises includes the following three areas:
1) orientation to social capital, which is a positive attitude and participation of human and social capital in innovation;

2) market orientation, including the ability to respond to market conditions, as well as adapting innovation to changing environmental conditions;
3) entrepreneurial orientation, which includes a proactive attitude of the company to risk and competition.

In the work of Maravelakis, the innovation potential of small business is explained as the ability of the company to identify and perceive business opportunities and effectively implement market innovations (Maravelakis et al., 2016).

Based on a comprehensive analysis of various theoretical approaches, Manjon, Mompo, Redoli formulated the following definition: innovation is a process that is stimulated through the promotion of research and development, the acquisition of technology, human or financial resources that lead to results in the form of product and process innovations or and both of them, i.e. companies engaged in product and process innovation achieve greater efficiency, sales growth, profit and market expansion than companies that do not innovate. (Manjon et al., 2016).

In the work of Glazunova, the innovation potential is explained as the ability and readiness of the organization to use production, labor, intellectual, scientific-technological, marketing, material-energy, infrastructure, financial-economic and managerial resources to implement the innovative development of the organization, ensure its innovative activities and achieve innovative goals. According to this definition, the organization's innovation potential can be represented as a dependence on the potentials of its subsystems (Glazunova 2016):

$$IP = f\,(P_p;\ P_l;\ P_{mar};\ P_r;\ P_{int};\ P_{st};\ P_{fe};\ P_{inv};\ P_{man}) \qquad (1)$$

Where:

P_p - production potential;
P_l - labor potential;
P_{mar} - marketing potential;
P_r - resource potential;
P_{int} - intellectual potential;
P_{st} - scientific and technical potential;
P_{fe} - financial and economic potential;
P_{inv} - investment potential;
P_{man} - management potential.

This approach considers the interaction of the organization's subsystems and the correct assessment of the innovation potential as part of the effective management of the organization's entire innovation activity.

A group of researchers from the Universities of Maribor (Slovenia) and Klagenfurt (Austria) considers the innovation potential of the company as the difference between the two states of the company: its goals and the actual state (Leskovar, Baggia, Metlikovič, 2008).

According to the author's approach of Kuzmina (2012), the innovation potential of the enterprise is one of the important resource components providing leadership in the competitive struggle. The author defines the innovation potential of the enterprise as the aggregate capabilities of the enterprise to achieve certain goals and solve problems of mastering new knowledge with the subsequent implementation process, resulting in new products, technology, process.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

In the work of Lapteva (2014), innovation potential is considered as an opportunity, readiness and the ability of an enterprise to create and use innovations with the available resources to obtain different types of effect (Figure 1).
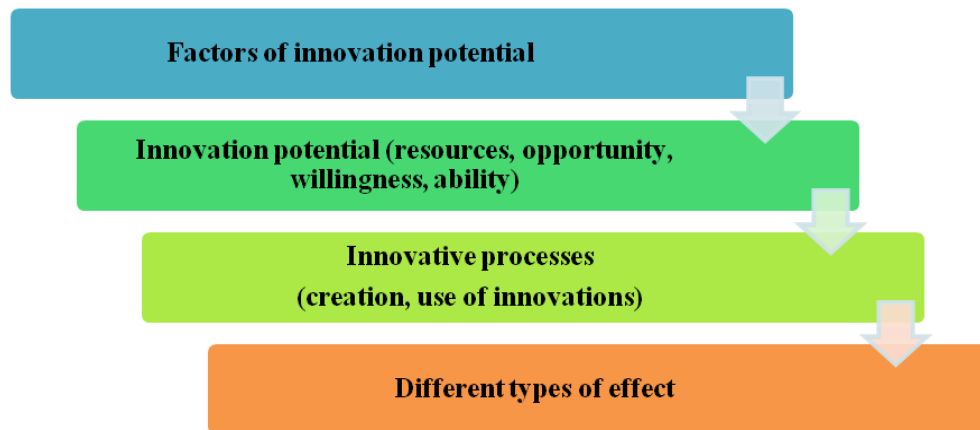
Figure 1. Innovation potential of the enterprise by Lapteva (2014)
Source: compiled by authors

The interpretation of Askarova (2016), based on the system approach, is also interesting. She proposes the definition of innovative capacity as the ability of the system to transform the actual order of things into a new state in order to meet existing or emerging needs, i.e. this is a kind of characteristic of the system's ability to change, improve, progress.

In general, the review of sources on this issue has shown that all approaches to the nature of innovation potential could be viewed from two aspects: first, innovation potential is a set of resource opportunities that enable the implementation of innovative projects; second, innovation potential as an indicator of the economic potential of the business entity.

Obviously, in order to identify the innovation potential of economic entities, taking into account all the significant indicators that characterize the various aspects of activity and the features of their innovation activities, it is necessary to determine the structure of the innovation potential of enterprises.

A review of the literature that, despite the existence of a wide range of definitions, the concept of "innovation potential of SMEs" does not have a well-developed and substantiated methodology for assessing innovation potential of SMEs. The authors of this study made an attempt to assess innovation potential of SMEs based on factors of influence on innovative products. Based on the set goal, the following tasks were set and solved in the research process: developed a conceptual model for the evaluation of innovation potential of SMEs, the analysis and the estimation of the innovation potential SMEs of Kazakhstan on the basis of three groups of factors: factors of SME development, factors of the General economic development of the country and factors of the development of research activities. On the basis of the results of the study, the identified factors influencing the final result of the innovative activity of SMEs were proposed Innovation activity characterizes the readiness to update the main elements of the innovation system - their knowledge, technological equipment, ICT and the conditions for their effective use, as well as sensitivity to everything new.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

## 3. Analysis of the current state

One of the important sectors for the implementation of the strategic objectives of innovative development of the economy of Kazakhstan is small and medium business, which serves as the foundation for ensuring the competitiveness of the economy and improving the welfare of the population of the country. The problem of using and enhancing the innovation potential of small and medium-sized businesses in Kazakhstan is becoming urgent due to the need to increase the role of small and medium business in the economy and the formation and development of innovative activities to increase the economic potential of the country as a whole. To identify the innovation potential of small and medium business in Kazakhstan, the level of their innovation activity in recent years will be analyzed. Innovation activity characterizes the readiness to update the main elements of the innovation system - their knowledge, technological equipment, ICT and the conditions for their effective use, as well as sensitivity to everything new.

According to the Methodology, approved by order of the Chairman of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan, the indicator of innovative activity is determined by the ratio of the number of innovatively active enterprises, that is engaged in any types of innovative activity, to the total number of existing enterprises and multiplying by 100 (Methodology for the formation of indicators of statistics of research and development works and innovations).
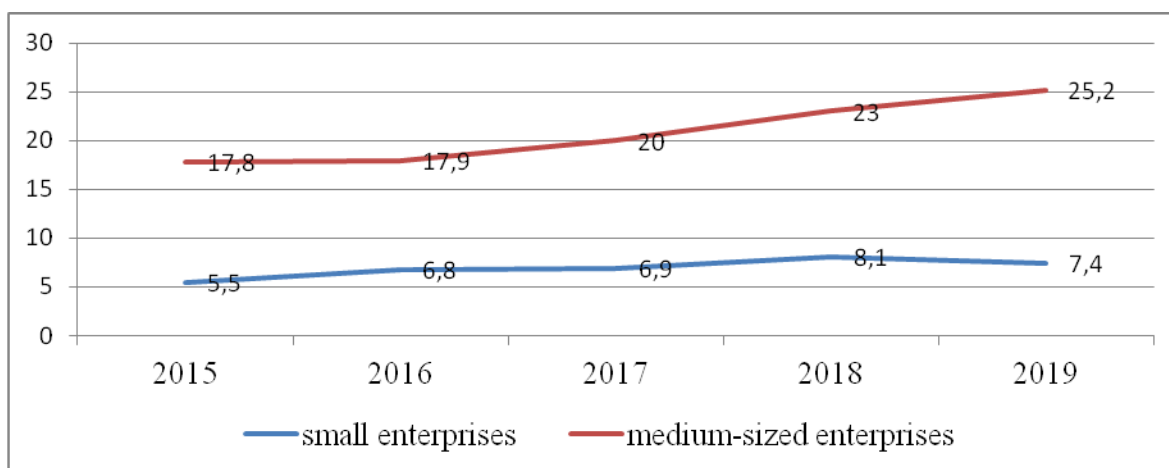
Figure 2. The level of innovation activities of small and medium-sized enterprises of the Republic of Kazakhstan, in %
Source: compiled by authors according to Methodology for the formation of indicators of statistics of research and development works and innovations

According to the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan, in 2019 the level of innovation activity of small and medium-sized enterprises increased in comparison with the indicator of five years ago, in particular for small enterprises by 1.9%, for medium-sized enterprises by 7.4%. Including the highest level of innovation activity of medium-sized enterprises (25,2%) rather than small (7,4%). An analysis of changes in the level of innovation activity of small and medium-sized enterprises over the past 5 years shows unstable dynamics (Figure 2).

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810
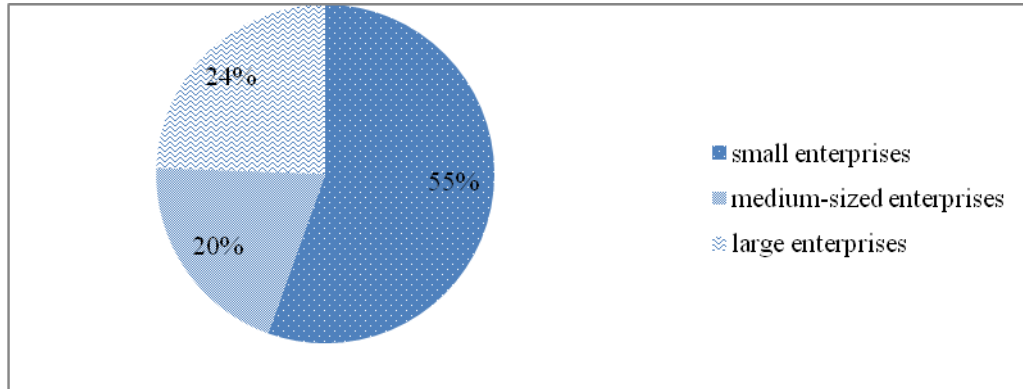
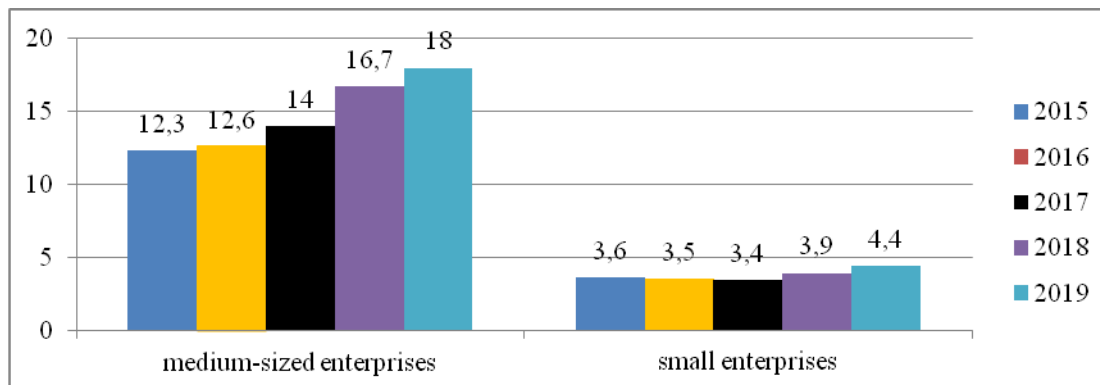**Figure 3.** Structure of enterprises of the Republic of Kazakhstan, which have innovations in 2019, %
Source: compiled by authors according to Internet resource of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

For completeness, the structure of enterprises that have innovations will be compared. According to the data of 2019, as shown in the diagram (Figure 3), the share of small and medium-sized enterprises that have innovations is lower than the share of large enterprises, which indicates that the main entities of innovation activity in Kazakhstan are mainly large enterprises.

In addition, the development of innovative activities of small and medium-sized businesses in Kazakhstan depends on regional innovation features. So, in the context of regions, small and medium-sized enterprises of Nur-Sultan (14.8%) and East Kazakhstan region (14.9%) are the most innovative, which level is 3.5% higher than the average for the republic. The least innovative are enterprises of West Kazakhstan (5.3%), Mangistau (3.4%) and Shymkent (7.3%) regions (Figure 4).
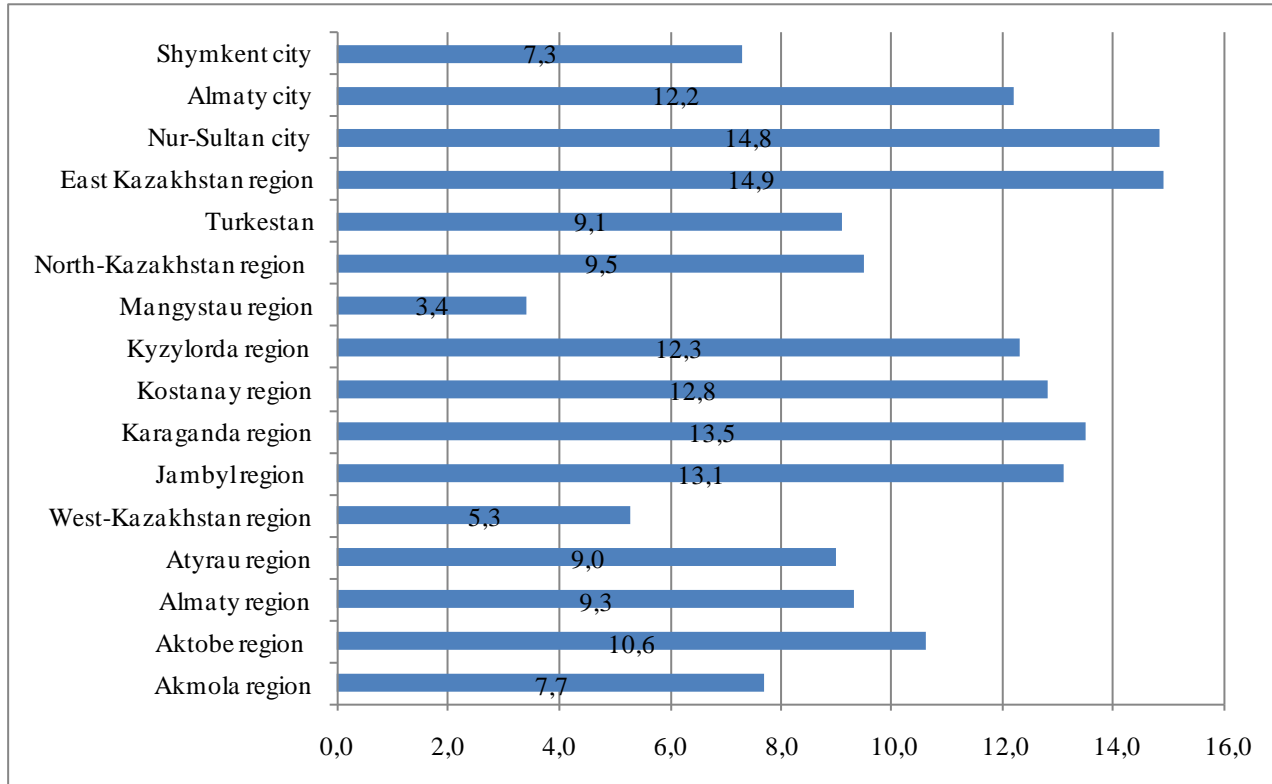
Figure 4. Level of innovation activity of small and medium-sized enterprises in Kazakhstan in the regional section in 2019, %
Source: compiled by authors according to Internet resource of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

Moreover, in order to identify the innovation potential of small and medium-sized businesses in Kazakhstan, we analyzed the level of innovation activity for major types of innovations such as product and process over the past 3 years.

In domestic practice, the calculation of the indicator of innovative activity of enterprises is based on two types of innovations. According to the Methodology for the formation of indicators of statistics of scientific research and experimental design works and innovations (Order No. 232 of the Chairman of the Committee on Statistics of the Ministry of the National Economy of the Republic of Kazakhstan dated from 6 October 2016), the following definitions of product and process innovation are given:
1) product innovation – is the implementation of a product or service that is new or significantly improved in terms of the properties or methods of use, and also includes significant improvements in technical characteristics, components and materials, embedded software, user friendliness or other functional characteristics;
2) process innovation – is the implementation of a new or significantly improved method of production or delivery of the product and includes significant changes in technology, manufacturing equipment and (or) software.
Accordingly, the level of innovation activity is determined by the ratio of the number of enterprises carrying out product and process innovations to the entire number of functioning enterprises

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Figure 5. The level of innovation activities of small and medium-sized enterprises in the RK for process and product innovations in 2015-2019, %
Source: compiled by authors according to Internet resource of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

As Figure 5 shows, the level of innovation activity in product and process innovations of medium-sized enterprises is significantly higher than of small enterprises (by 4 times, according to 2019), which indicates that medium-sized enterprises, by virtue of their capabilities, have more innovation potential than small enterprises. As for the dynamics of the level of innovation activity in product and process innovations, there is also a positive tendency for medium-sized enterprises (an average increase of 1.42% per year), while for small enterprises a rise is observed by 1% in 2019 compared to 2017, and a decrease of 0.1% in comparison with 2015.

Summarizing the analysis of the level of innovation activities of small and medium-sized enterprises in Kazakhstan, several important points could be highlighted:
- The innovation potential of small and medium-sized enterprises is significantly lower compared to large enterprises, which indicates the need to formulate and implement a targeted innovation policy in the sphere of small and medium-sized businesses;
- in the context of the intra-sectoral structure, the level of innovation activity of small enterprises in comparison with medium-sized enterprises ought to be better, as evidenced by the data for the last three years, which mainly affects the competitiveness and efficiency of small enterprises as a whole;
- the uneven development of innovation activities of small and medium-sized enterprises by regions, which in turn determines the unevenness of economic development and the resource potential of the regions (the indicator of the region with the highest level of innovation activity (14.9%) is 4.4 times higher than the region with the lowest level (3.4%);
- a significantly low level of product and process innovation of small and medium-sized enterprises, which are basic in the innovation activity of economic entities, providing mainly improvements in the quality of products and raising the technical level of production.

4. Institutional framework for supporting innovation development

An important aspect of supporting the innovative development of SMEs is the creation of specialized structures and institutions that form the infrastructure of innovation activity, among which, first of all, JSC National Innovation Fund (NIF) established in 2003 by the resolution of the Government of the Republic of Kazakhstan dated 30.05. 2003 with 100% state participation in the authorized capital, which was reorganized in 2012 in JSC "National Agency for Technological Development" (NATD - further Agency). The main goal of the activity is coordination of innovative development processes and provision of state information, analytical and investment support. For a relatively short period from the foundation of the Agency, significant results have been achieved, including:

1) the framework of investment support, the Agency provides financing for innovative projects and the creation of venture funds. At the end of 2018, the agency allocated 4.67 billion tenge to finance innovative projects and provide services.

2) the framework of information and analytical support, Agency developed normative documents and state programs. So in 2010, the Government approved the Program for the Development of Innovation and Assistance for Technological Modernization until 2014, and in 2012 the Law of the Republic of Kazakhstan "On State Support of Industrial Innovative Activities" was adopted. Proposals to the Tax Code were formed, according to which enterprises can reduce the taxable base by 50% of the cost of research and development (R & D).

3) the Agency's total investment portfolio as of 2018 is 2.36 billion tenge ($13 million), which includes 5 project companies and 6 venture funds (3 domestic and 3 foreign).

4) the development of the system of commercialization of technologies in 2011, the Agency created 9 commercialization offices with the best research institutes and universities in Kazakhstan, which are the link between science and business in order to promote the results of research activities to the market.

5) in order to stimulate innovation activities, the Agency carries out activities to promote innovation and revitalize the rationalization movement. Annually there are an international innovation congress, competitions of innovative business projects and rationalization solutions, a contest of journalistic materials, as well as exhibitions of domestic innovative projects.

6) 8 regional technology parks and 3 design bureaus are created and are functioning in order to develop the innovation infrastructure, the free economic zone "Park of Innovative Technologies" is functioning on the territory where an innovation cluster on the principle of "education-science-technology-production" is planned to be created.

7) during the period between 2011 and 2015, the Agency set up five international technology transfer centers in Korea, China, the USA, Russia and France to implement and promote joint technology transfer projects. As a result, 15 Kazakh enterprises were assisted in the transfer of technology in the region of the mining and metallurgical complex, agriculture, power engineering and machine building, etc. (The development strategy of the joint stock company "National Agency for Technological Development" for 2014-2023).

In addition to the National Agency for Technological Development, in order to promote the development of priority, initiative, risk research and development work in 2006, JSC "Science Foundation" was established. According to the decision of the Higher Scientific and Technical Commission under the Government of the Republic of Kazakhstan dated 21.04.2011, the priority areas of the investment activity of the Science Foundation are: energy, deep processing of raw materials and products, information and telecommunication technologies, life sciences, intellectual potential of the country. The Fund provides loans to scientists in the amount of 50 thousand to 2 million US dollars, planning to establish an enterprise or to realize the results of its research activities for 3-5 years. During the 10 years of its activity, the Fund has financed 22 research projects for a total amount of 242.2 million tenge ($ 752,000) and provided innovative grants for financing 28 projects for 690.2 million tenge ($ 2.1

million). Another important player on the innovation field is the Development Bank of Kazakhstan, which was founded in 2001. The Bank renders financial support to the private sector and state organizations in the implementation of infrastructure projects and lending to industrial enterprises. In the framework of GPIFIR, the Bank participated in the implementation of 22 investment projects with a total value of more than 5.6 billion US dollars, of which 3.8 billion US dollars was allocated by the Bank. Among them there are strategically important projects such as Kazakhstan Electrolysis Plant, Kazakhstan Petrochemical Industries, Atyrau Oil Refinery and others.

Entrepreneurship Development Fund "Damu" was established in 1997 with the aim of financial and non-financial support the small and medium-sized enterprises (SMEs), as well as stimulating demand for their products. Initially, Damu was responsible for managing public funds received on credit from the Asian Development Bank (ADB) and the European Bank for Reconstruction and Development (EBRD). In 2002, the Fund began direct financing of SMEs at its own expense. Over the years of the foundation's work, they received financial support for a total of 1,505 billion tenge ($ 4.6 billion) of about 31,000 SMEs. Most of these funds (approximately 70%) were used on stabilization programs to support enterprises affected by the financial crisis through interest rate subsidies, loan guarantees, charter capital, etc. Priority is given to regional support programs, financing of the real production sector, women's entrepreneurship, as well as leasing financing for SMEs. Since 2009, Damu also provides non-financial support, which includes training and consulting services, business plan preparation services, the creation of a nationwide network of business support centers.

The Investment Fund of Kazakhstan (IFK) was established in 2003 for private investments into share capital. IFK is engaged with investing in new and existing companies that deal with the processing of raw materials, using new technologies. The Fund also finances investment projects abroad in the framework of industrial cooperation between national and foreign companies (Kulmaganbetova, 2013).

5   Methodology

The methodology of this study includes the study of theoretical approaches to the assessment of innovation potential, as well as the collection of necessary statistical data for its implementation. During the formulation of the problem in question, the task was set to identify the main groups of factors affecting the indicator of innovation potential of small and medium-sized businesses in the Republic of Kazakhstan, as an indicator of the volume of manufactured innovative products. The basis for this approach to the choice of the indicator of innovation potential of enterprises is the evolutionary theory of factors of production, according to which the produced product is considered as a function of the aggregate of resource (human, technical, technological, material, institutional, organizational and information) opportunities of production. In this paper, it is proposed to consider the volume of innovative products as a result of the implementation of the innovation potential (Inshakov, 2006).

Using the proposed methodology for evaluating innovation potential, there was a study conducted of the impact of factors on the volume of produced innovative products by small and medium-sized enterprises in Kazakhstan using statistical analysis applying the PSPP package. At the initial stage of the study, official statistical data for the period of 2010-2019 were collected and processed by the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan in the public domain.

An empirical analysis of the available data allowed to develop a conceptual model of the connectivity of the innovation potential of small and medium-sized enterprises with the factors grouped as follows (Table 1):

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Table 1. Factors affecting the innovation potential of small and medium-sized enterprises

Name of group	Factors
Factors of development of small and medium-sized enterprises	1. The number of SMEs 2. The share of SMEs in GDP 3. The level of employment in SMEs 4. The volume of production of SMEs 5. Fixed assets of small and medium-sized enterprises
Factors of General economic development of the country	1. Volume of GDP 2. The share of innovative products produced in GDP 3. Costs of production of innovative products 4. The volume of production of industrial products 5. Investments in fixed assets 6. The inflow of foreign direct investment
Factors in the development of research activities	1. The number of employees performing R&D 2. Expenditures on R&D 3. The share of R&D expenditure in GDP 4. The number of organizations conducting R&D 5. The average monthly wage of employed R&D 6. The volume of produced innovation products 7. The number of students and doctoral students of higher educational institutions 8. The number of teaching staff of higher educational institutions

Source: compiled by authors

A review of the literature on the problem under study showed that there is no unified methodology for assessing innovative potential that reveals the features of its development at all levels. Taking into account the above, the authors propose a grouping of factors influencing the innovative potential of SMEs at the macro, micro and meso levels.

1 group - the factors of small and medium-sized business development that determine the necessary conditions for the development of innovative activities of SMEs and include the number of SMEs, the share of SMEs in the country's GDP, the level of employment in SMEs, the volume of SMEs production, the availability of fixed assets of small and medium-sized enterprises;

2 group - factors of the country's overall economic development are considered as factors determining the potential of the national economy, an important part of which is small and medium business and provides effective innovation activities. Among these factors, there are the volume of GDP, the share of innovative products produced in GDP, the costs of production of innovative products, the volume of industrial production, investment in fixed assets, the inflow of foreign direct investment;

3 group - the factors of the development of research activities are factors determining the level of development of science and technology, which are the basis for the implementation of innovative activities at SMEs. It includes the number of employees performing R&D, R&D expenditures, the share of R&D expenditures in GDP, the number of R&D organizations, the level of wages of R&D workers, the volume of innovative products produced, the number of students in higher education institutions, the number of professors and instructors of higher education institutions, etc.

6. Results

For further evaluation, a correlation matrix was constructed that made it possible to determine the 13 variables associated with the volume of produced innovative products by small and medium-sized enterprises in Kazakhstan (Table 2).

Table 2. Variables associated with the volume of innovative products produced by SMEs in Kazakhstan

Indicators	Correlation coefficient
1. Number of SMEs	0,83
2. The share of SMEs in the country's GDP	0,77
3. Number of employees in the SME	0,82
4. Production of SMEs	0,93
5. Volume of GDP	0,94
6. Costs for product and process innovation	0,73
7. Volume of production of industrial products	0,83
8. Investments in fixed assets	0,92
9. Average monthly wage of employed R&D	0,92
10. Costs of R&D	0,7
11. Volume of produced innovation products	0,92
12. Number of doctoral students of higher educational institutions	0,95
13. Fixed assets of small and medium-sized enterprises	0,8

Source: compiled by authors

Based on the results of checking the coherence and consistency of statistical indicators using methods of measurement theory and correlation analysis, the authors developed a model for assessing the influence of factors on the innovation potential of small and medium-sized enterprises (Figure 6).
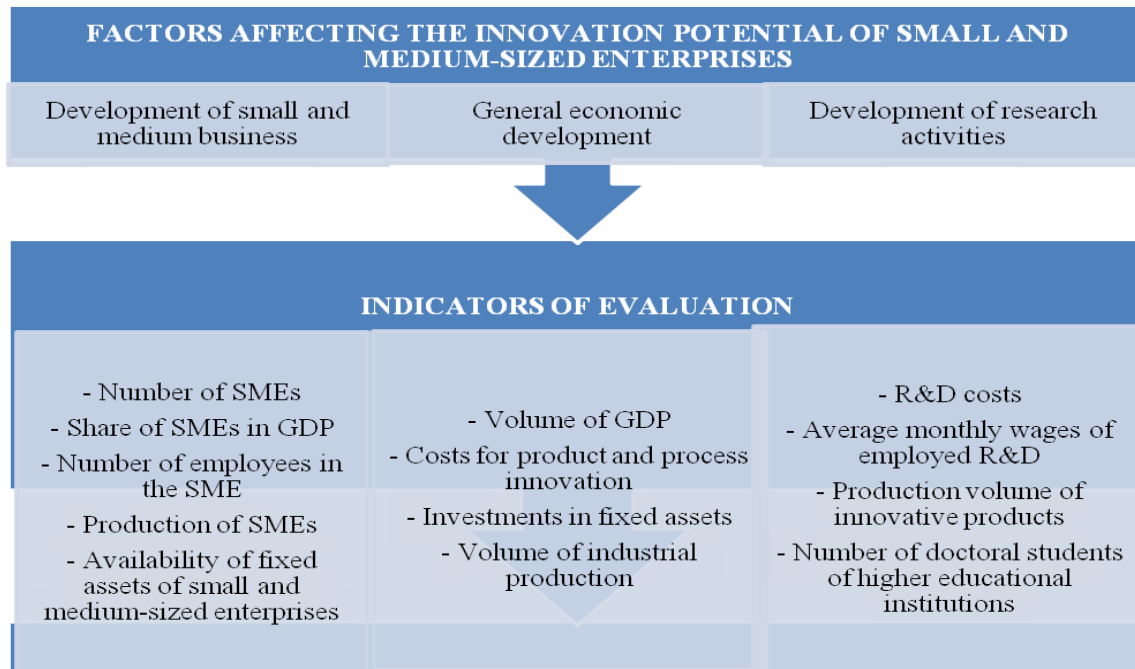
Figure 6. The model for assessing the impact of factors on the innovation potential of SMEs
Source: compiled by authors

The grouping of variables into the appropriate groups was carried out on the basis of an assessment of the internal consistency (reliability, consistency) of the indicators included in the group. For this purpose, the Cronbach alpha

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

coefficient was calculated in the PSPP program, which characterizes the internal consistency (homogeneity) of the variables (Dubina, 2010).

To form groups of internally consistent indicators, the following property of the alpha coefficient was used. If you exclude any indicator from the group, the alpha coefficient will change (decrease or increase). With the exclusion of indicators that do not contradict other indicators (in the sense that they are all aimed at measuring the general factor), the Cronbach alpha coefficient decreases. And, on the contrary, if you exclude indicators that do not agree with others, the value of the alpha coefficient will increase. The Cronbach alpha coefficient takes values in the range from 0 to 1. It is considered that the values of α 0.6 indicate a fairly acceptable measurement consistency, and the values α 0.8 characterize good consistency (Dubina, 2010).

Thus, it was possible to form three groups of variables corresponding to 3 factors (Figure 6). For variables (economic indicators) included in the first group (development of small and medium businesses), the alpha coefficient was 0.98. For the second group (general economic development) and the third group (Development of R&D), this figure is 0.95.

So, a model coordinated and collated by indicators has been constructed, it describes the relationship of the evaluation indicators to the main groups of factors affecting the innovation potential of small and medium-sized enterprises.

To determine the degree of influence of changes in independent variables (X) on the volume of innovative products produced (Y) by small and medium-sized enterprises in Kazakhstan, the pairwise linear regression method is applied (Table 3). Pairwise regression models were constructed, since the multiple regression models are statistically insignificant due to the multicollinearity effect (the connectivity of the attributes included in the model) (Dubina 2010).

In this study, the hypothesis is to determine the degree of influence of changes in factors on the final result of innovative activities of SMEs.
As a result of the simulation, the following equations of pair regression were obtained:

1. $Y = -195347,79 + 0,37X_1 \pm 56150,48$; X_1 – Number of SMEs
2. $Y = -160363,33 + 14396,71X_2 \pm 63500$; X_2 – The share of SMEs in GDP
3. $Y = -423798,9 + 0,21X_3 \pm 57564,5$; X_3 - Number of employees in the SME
4. $Y = -43481,2 + 0,02X_4 \pm 37070,6$; X_4 - Production of SMEs
5. $Y = 12130,42 + 0,01X_5 \pm 60598,7$; X_5 – Fixed assets of small and medium-sized enterprises
6. $Y = -201343,92 + 0,01X_6 \pm 71508,3$; X_6 – Costs of R&D
7. $Y = -97887,83 + 7,48X_7 \pm 35241,46$; X_7 – Volume of GDP
8. $Y = -121063,74 + 1,81X_8 \pm 39283,88$; X_8 – Average monthly wage of employed R&D
9. $Y = -21573,91 + 0,46X_9 \pm 40086,65$; X_9 – Volume of produced innovation products
10. $Y = -31794,07 + 110,52X_{10} \pm 31448,93$; X_{10} – Number of doctoral students
11. $Y = -230722 + 0,06X_{11} \pm 38791,36$; X_{11} – Investments in fixed assets
12. $Y = -155274,34 + 0,02X_{12} \pm 55639,15$; X_{12} – Volume of production of industrial products
13. $Y = 54932,69 + 0,16X_{13} \pm 68029,74$; X_{13} – Costs for product and process innovation

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Table 3. Parameters of the pair regression model

Variables	R square	B
1. Number of SMEs	0,69	0,37[*]
2. Share of SMEs in GDP, %	0,6	14396,71[*]
3. Availability of fixed assets of SMEs, mln. tg	0,63	0,01[*]
4. Gross domestic product, billion tg	0,88	7,48[*]
5. Number of employees in SMEs, pers	0,67	0,21[*]
6. Production of SMEs, mln tg	0,86	0,02[*]
7. Number of students in higher education institutions, pers	0,84	-1,02[*]
8. Number of doctoral students, pers.	0,9	110,52[*]
9. Investments in fixed assets, mln. tg	0,85	0,06[*]
10. Average monthly nominal wages of employed R&D, tenge	0,85	1,81[*]
11. Volume of innovative products produced, mln tg	0,84	0,46[*]
12. Volume of industrial production, mln tg	0,69	0,02[*]
13. Costs for product and process innovation, mln tg	0,54	0,16
[*] - p- level of statistical significance < 0.01		

Source: compiled by authors

The parameters of the constructed regression models allow us to compare the connectedness of the variability of the effective indicator (the volume of the innovative products produced) with the variability of the corresponding indicators. This connectivity could also be interpreted as the degree of influence of factor characteristics on the outcome. Thus, the emergence of each new enterprise in the SME will lead to an increase in the volume of innovative products by an average of 370 thousand tenge ($ 1,1 thousand), an increase in the share of SMEs in GDP by 1% - by 14,396 billion tenge ($ 44.7 million), an increase in the number of people employed in SMEs by 1 person - by 210 thousand tenge ($ 652), an increase in R&D expenses by 1,000 tenge ($ 3) - by 10,000 tenge ($ 31), an increase in GDP by 1 billion tenge ($ 3.1 million) - by 7.48 million tenge ($ 23.2 thousand), an increase in the average monthly salary of employed R&D by 1,000 tenge ($ 3) - by 1.81 million tenge (5,6 thousand dollars), an increase in the number of doctoral candidates by 1 person will lead to an increase in the volume of innovative products by an average of 110.52 million tenge ($ 343.2 thousand).

In order to analyze the influence of different groups of factors on the volume of produced innovative products, small and medium-sized enterprises calculated the aggregated indicators for each group of factors, the degree of correlation that is quite high with the volume of innovative products produced, which demonstrates the compatibility of integrated factors for characterizing the innovation activity of SMEs (Table 4).

Aggregated indices were calculated from the corresponding groups with high internal consistency (reliability), determined using the Cronbach alpha coefficient. Since the indicators in the group have different scale and dimension, they were reduced to a standard z-distribution with an average of 0 and a standard deviation of 1:

$$R_{nz} = \frac{R_c - m}{s},$$

Where:

R_{nz} - is the z-normalized value of the indicator for the analyzed group;
R_c - is the initial value of the indicator for the analyzed group;
m - is the average value for the characteristic in the group;
s - is the standard deviation for the characteristic in the group.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

With this transformation, the indicators with values less than the average for the group will have negative values, with large - positive.
As a result, sets of values of three indices corresponding to three groups of analyzed factors were obtained.

Table 4. Parameters of the degree of dependence of the volume of innovation products produced from different groups of factors

Group of factors	Alpha Cronbach (reliability)	Correlation with aggregated index	Closeness of the relationship between the aggregated indicator and the dependent variable
Factors of development of small and medium business	0,98	0,87	75,69%
Factors of General economic development of the country	0,95	0,88	77,44%
The factors in the development of research activities	0,95	0,93	86,49%

Source: compiled by authors

Correlation-regression analysis showed the presence of very high bonds of aggregated indices with the result of innovation activity of SMEs. Thus, the variability of the output of innovative products by small and medium-sized enterprises in Kazakhstan depends on 75.7% of the development factors of small and medium-sized businesses, by 77.44% of the factors of the general economic development, the highest degree of cohesiveness has been found with the factors of development of research activities (86.5%).

7. Conclusion

Based on the assessment, it was revealed that the closeness of the relationship of the aggregated indicator for micro-level factors was 86.49%, meso-level factors 75, 69% and macro-level factors 77.44%. This means that for the development of innovation potential of SME, the factors of development of research activities are of the greatest importance, and the factors of development of small and medium-sized businesses are of the least importance.
The conducted studies made it possible to conclude that in assessing the innovation potential of SMEs, the key point is the opportunities for innovative development of small and medium-sized enterprises, which ultimately are expressed by the volume of innovative products produced by them.

On the basis of the correlation-regression analysis of the influence of factors on the effectiveness of innovation activity of small and medium-sized businesses, it was possible to develop a conceptual model for assessing the innovation potential of SMEs in the Republic of Kazakhstan, which includes three main groups of indicators, namely, the group of "SME development indicators", indicators of the "general economic development of the country" and a group of "indicators of scientific and innovation activities". The conceptual model allows to integrate the results of innovation activities of enterprises and existing conditions for its development both at the macrolevel and at the sectoral level.

Also, during the research it was revealed that the volume of produced innovative products by SMEs in Kazakhstan is most influenced by factors such as the volume of GDP produced in the country (correlation coefficient - 0.94), the volume of products produced by SMEs (correlation coefficient - 0.93), the volume of

innovative products produced in the economy in general (correlation coefficient - 0.92), the volume of investment in fixed assets (correlation coefficient - 0.92), and the level of wages engaged in R&D (correlation coefficient - 0.92).

In addition, as shown by the correlation analysis, there is a very weak relationship between the result of innovation activity of small and medium-sized enterprises with such factors as the number of workers performing R&D, the share of R&D expenditures in GDP, the number of organizations performing R&D, the share of innovative products produced in GDP, the teaching staff of higher education institutions, and the influx of foreign direct investment. As one of the main reasons for the low degree of coherence of the outcome indicator with factorial, the so-called "deferred effect" of the influence, which in innovation activities manifests itself after a certain period of time, is considered.

On the basis of the construction of the pair regression model, it has been established that SMEs, the share of SMEs in GDP, the number of people employed in SMEs, the cost of R&D, the volume of GDP, the average monthly salary of employed R&D, the number of doctoral candidates, have a significant impact on the volume of SMEs produced by innovative products. The degree of influence of the relevant factors is also determined.

Proceeding from the results of the assessment of the influence of factors on the results of innovation activity of SMEs subjects, the most important problems are identified, which need to be paid attention to further enhance their innovation potential:
- the need to increase the level of innovation activities of SMEs by encouraging the creation of innovative enterprises;
- the need to create conditions for the development of SMEs to increase the share of SMEs in the production of the country's GDP;
- increase in the level of employment in the SME, which is expressed by the increase of labor potential, which is an important component of the whole SME potential;
- stimulation of financing of research and development activities of small and medium-sized enterprises, designed for a long-term perspective of innovation;
- the solution of the most important issues in the staffing of innovation activities of SMEs, in particular the increase of wages of employed R&D, the provision of science personnel to SMEs.
The novelty of this study lies in the development of a system of factors affecting the innovation potential of SME and its assessment using the economic and statistical method.

References

Askarova, A. 2016. Evaluation of the innovation potential of small businesses. Almaty. 212p.

Bayzholova, R., Esmagulova, N., Sadykova, P. 2014. The problems of innovative development of manufacturing industry and the innovative capacity of manufacturing enterprises in Kazakhstan. Actual problems of economics, Kiev, 10(157), 92-112.

Calantone, R., Cavusgil, S., Zhao, Y. 2018. Learning orientation, firm innovation capability, and firm performance. Industrial Marketing Management, 6(31), 515-524. https://doi.org/10.1016/S0019-8501(01)00203-6

Carpinetti, L., Gerolamo, M., Galdamez, E. 2017. Continuous innovation and performance management of SME clusters. Creativity and Innovation Management, 16(4), 376-385. https://doi.org/10.1111/j.1467-8691.2007.00448.x

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Cocca, P., Alberti, M. 2018. A framework to assess performance measurement systems in SMEs. International Journal of Productivity and Performance Management, 59(2), 186-200. https://doi.org/10.1108/17410401011014258

Dewangan, V., Godse, M. 2017. Towards a holistic enterprise innovation performance measurement system. Technovation, 14 (34), 536-545. https://doi.org/10.1016/j.technovation.2014.04.002

Dubina, I., Ostashchenko, T. 2016. Evaluation of intellectual and innovation activities of the regions of the Siberian Federal District. Altay Bulletin of Finanacial University, 1(11), 9-19.

Dubina, I. 2018. Math-statistical methods in empirical socio-economic studies. Moscow: JURAIT, 565p.

Glazunova, V. 2016. Modern problems in assessing the innovation potential of organizations. Internet-journal "Science", 1, 212-218. http://dx.doi.org/10.15862/78EVN116

Hoq, M., Ha, N. 2019. Innovativeness: its antecedents and relationship to SME business performance. Proceedings of ANZMAC. Australian & New Zealand Marketing Academy. Melbourne, Australia, 12 (36), 11-19. https://doi.org/10.2139/ssrn.1851423

Inshakov, O. 2018. Economic genetics as the basis of the evolutionary economy. Bulletin of VolGU, 10(17), 6-16.

Ismailova, R., Yesmagulova, N., Japarova, K. 2016. Assessment of innovations effectiveness in the manufacturing industry of Kazakhstan. Actual problems of economics, Kiev, 9 (183), 54-59.

Kenzhebayeva, Z., Toiganbayeva, A., Akhmetova, S. 2014. Problems of increasing the competitiveness of the national economy of the Republic of Kazakhstan. Actual problems of economics, Kiev, 5(155), 113-118.

Kumar, M. (2019). Global environmental policies with innovation spillovers. Management of Environmental Quality: An International Journal, 30(4), 833-850. https://www.emerald.com/insight/content/doi/10.1108/MEQ-05-2018-0098/full/htm l

Kuzmina, O. E. 2017. Identification of factors of influence and indicators of the conditions for the development of small businesses to assess innovative capacity. Innovation Journal, 3(14), 33-37.

Kulmaganbetova, A. 2013. State and problems of innovative development of Kazakhstan. Bulletin of the Russian University of Friendship of Peoples, 3(11), 5-15.

Kurmanov, N. 2016. A Research on Innovation in Small and Medium-sized Enterprises: The Case of Kazakhstan. International Journal of Economics and Financial Issues, Econjournals, 6(3), 907-910.

Kurmanov, N., Yeleussov, A., Aliyev, U., Tolysbayev, B. 2015. Developing Effective Educational Strategies in Kazakhstan. Mediterranean Journal of Social Sciences, Italy, 6(5), 54-61. https://doi.org/10.5901/mjss.2015.v6n5s1p54

Lapteva, E. 2014. Problems of evaluation of innovation potential of industrial enterprises. Management of economic systems, 8 (11), 199-124.

Leskovar, R., Baggia, A., Metlikovič, P. 2018. Assessment of innovation potential in small and medium enterprises. Industrial Engineering and Engineering Management. IEEE International Conference on Industrial Engineering and Engineering Management, 949-953.

Manjon, J., Mompo, R., Redoli, J. 2016. Accelerating Innovation in Small and Medium-sized Enterprises in the ICT Services Sector. SAGE Open, 1-9. https://doi.org/10.1177/2158244016670198

Maravelakis, E., Bilalis, N., Antoniadis, A., Jones, K., Moustakis, V. 2016. Measuring and benchmarking the innovativeness of SMEs: A three-dimensional fuzzy logic approach. Production Planning & Control, 17(3), 283-292. https://doi.org/10.1080/09537280500285532

Mazzoni, F. (2020). Circular economy and eco-innovation in Italian industrial clusters. Best practices from Prato textile cluster. Insights into Regional Development, 2(3), 661-676. https://doi.org/10.9770/IRD.2020.2.3(4)

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Official site of Economist Intelligence Unit (EIU). http://www.eiu.com/home.aspx

Official site of Joint Stock Company "Science Foundation". www.science-fund.kz

Official site of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan. http://www.stat.gov.kz

Official site of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan. Methodology for the formation of indicators of statistics of research and development works and innovations. https://stat.gov.kz/faces/wcnav_externalId/homeMethodologySubPage?lang=ru.

Official site of the Boston Consulting Group. https://www.bcg.com

Official site of the European Innovation Scoreboard. http://ec.europa.eu/growth/industry/innovation/ facts-figures/scoreboards_en

Rosenbusch, N., Brinckmann, J., Bausch, A. 2011. Is innovation always beneficial? A meta-analysis of the relationship between innovation and performance in SMEs. Journal of Business Venturing, 26(4), 441-457. https://doi.org/10.1016/j.jbusvent.2009.12.002

Strategy of the joint stock company "National Agency for Technological Development" for 2014-2023. www.natd.gov.kz

Xiong, Zh., Ye, J., Wang, P. (2019). Does the Institutional Environment Affect the Failed Technological Innovation in Firms? Evidence from Listed Companies in China's Pharmaceutical Manufacturing Industry. Transformations in Business & Economics, Vol. 18, No 1 (46), 60-80.

Zawislak, P. 2018. Innovation capability: from technology development to transaction capability. Journal of Technology Management & Innovation, 7(2), 14-26. https://doi.org/10.4067/S0718-27242012000200002

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Almira KULMAGANBETOVA is PhD student of L.N. Gumilyov Eurasian National University, Nur-Sultan, Kazakhstan. Research interests: small and medium business, innovations, investments.
ORCID ID: orcid.org/0000-0002-0370-0809

Igor DUBINA is Doctor of Economic Sciences, Professor of Novosibirsk State University, Novosibisrk, Russian Federation. Research interests: finance, taxes, investments, budget, credit.
ORCID ID: orcid.org/0000-0002-6241-0932

Zhibek RAKHMETULINA is Candidate of Economic Sciences, Professor of L.N. Gumilyov Eurasian National University, Nur-Sultan, Kazakhstan. Research interests: small and medium business, innovations, investments.
ORCID ID: orcid.org/0000-0002-9973-9627

Elvira TLESSOVA is Candidate of Economic Sciences, Professor of L.N. Gumilyov Eurasian National University, Nur-Sultan, Kazakhstan.Research interests: small and medium business, innovations, investments.
ORCID ID: orcid.org/0000-0001-7057-0461

Zhanat TULEGENOVA is Candidate of Economic Sciences, Professor of Turan-Astana University, Nur-Sultan, Kazakhstan.Research interests: small and medium business, innovations, investments.
ORCID ID: orcid.org/0000-0003-0426-9368

_____

MODELING OF EURO STOXX 50 INDEX PRICE RETURNS BASED ON INDUSTRIAL PRODUCTION SURPRISES: BASIC AND MACHINE LEARNING APPROACH

Ligita Gasparėnienė [1], Rita Remeikienė [2], Aleksejus Sosidko [3], Vigita Vėbraitė [4], Evaldas Raistenskis [5]

[1,2,4,5] Vilnius University, Law Faculty, Sauletekio av. 9, Vilnius, Lithuania

[3] Mykolas Romeris University, Faculty of Public Governance and Business, Ateities str. 20, Vilnius, Lithuania

*E-mails: [1]ligita.gaspareniene@tf.vu.lt ; [2]rita.remeikiene@tf.vu.lt (Corresponding author)
[3]alsosidko@mruni.eu , [4]vigita.vebraite@tf.vu.lt, [5]evaldas.raistenskis@tf.vu.lt*

Abstract. There are a big number of researches which analyzing stock price returns. Some of them is based on fundamental analysis theory. Meanwhile other studies are based on efficient market hypotheses and financial behavior theories. However, there is not enough researches combining the characteristics of these theories into one. Such kind of researches in the scientific literature is usually referred to macroeconomic news, announcements, surprises, expectations studies. These studies examine not only the actual but also the predictive values of macroeconomic indicators announcements, normalizing them and thus creating absolutely a new surprise indicator. Purpose of this paper is modeling EURO STOXX 50 index price returns based on Industrial production surprise indicator. Empirical part shows that the best models for explaining EURO STOXX 50 index price returns was obtained at the 40 and 42 in different surprise indicator scenario. The coefficient of determination was obtained respectively 24.70% and 21,80%. Meanwhile applying machine learning method of artificial intelligence, a much more accurate models were obtained. The coefficient of determination respectively was 33,22% and 26,60%.

Keywords: surprises; price; return; EURO STOXX 50; Industrial production

JEL Classifications: L16, P22.

Additional disciplines: mathematics, statistics, law

1. Introduction

Attempts to explain and predict changes of stock price returns have been trying for decades. Some of them is based on fundamental analysis theory (Tetteh, et. al., 2019; Abed, Zardoub, 2019; Ho, 2018). Meanwhile other studies are based on efficient market hypotheses (Altinkilic, et. al., 2015; Fama and French, 2015; Yen and Lee, 2008) and financial behavior theories (Kozel, 2015; Pasquariello, 2014; Nawrocki and Viole, 2014). However, there are not enough researches combining the characteristics of these theories into one. Such kind of researches in the scientific literature is usually referred to macroeconomic news, announcements, surprises, expectations studies (Alexiou, et. al., 2018; Cakan, Gupta 2017; Nadleri, and Schmidti, 2016; Chen, et. al., 2015; Miao, et. al., 2014; Gurgul, Wójtowicz, 2014; Harju, Hussain, 2011; Gupta, Reid 2012; Hussain, 2010; Masood et al., 2020 and others). These studies examine not only the actual but also the predictive values of macroeconomic indicators announcements, normalizing them and thus creating absolutely a new surprise indicator.

However, the high frequencies analysis is not sufficiently developed in those studies. As a result, it becomes unclear how quickly the stock price returns adapt to the economic indicators announcements. The above-mentioned studies examine the stock markets of the USA, South Africa, Poland, and China, but there is a lack of research examining the stock market of the Eurozone. None of them uses scenario analysis. There is also not enough research to model stock price returns based on Industrial production announcements. Lastly, there are not enough studies which modeling stock price returns based on basic and machine learnings methods and at the same time compared them to each other. By reasons mention above a scientific problem is formulated further. What is the specificity of economic indicators surprises and how to model stock price returns based on Industrial production surprises?

The main purpose of the article is to construct, test, analyze and compare models for predicting the impact of industrial production surprises on EURO STOXX 50 returns changes based on basic and machine learning approaches. The following tasks are pursued: 1. To reveal the methods of modeling stock price returns based on economic indicators surprises and to review legal regulations related to securities in the EU and the USA. 2. To create methodology for modeling stock price returns based on economic indicators surprises. 3. To construct, test, analyze and compare models for predicting EURO STOXX 50 index price returns based on Industrial production surprises.

Research methods: 1. Systematic analysis of the scientific and law literature. 2. Comparative analysis. 3. Correlation analysis. 4. Analytical-logical method. 5. High frequency data analysis. Regression analysis based on OLS method (both basic and machine learning approaches)

2. Literature review: modeling stock returns based on economic indicator's surprises

Studies which is aimed at modeling changes in stock price returns and incorporating individual elements of fundamental analysis, efficient market hypotheses and financial behavior theories in the scientific literature is usually referred to macroeconomic news, announcements, surprises, expectations studies (Zhai, et. al., 2020).

Researchers Alexiou, et. al. (2018) analyzed the response of 25 equity portfolios to macroeconomic surprises spanning the period from April 1998 until May 2017. The three methodological methods used in this study which shown that the ISM Institute of Supply Management non-manufacturing index, the number of employees working in the non-agricultural sector (employees on non-farm payrolls), retail sales, personal consumption personal

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

consumption expenditure and initial jobless claims have a significant impact on portfolio returns. It was also found that the surprises in the ISM non-production index, personal consumption expenditure and unemployment claims indicators shape certain trends in various portfolios. It is observed that by creating portfolios with companies that have higher operating profitability and investment level, the investor can potentially reduce the risk of volatility arising from the above three macroeconomic indicators.

The US macroeconomic indicators such as "PPI, CPI, state employment, employment situations, labour turnover, and job openings, US export/imports, unemployment, real earnings, earnings of wages and salary, business employment dynamics and employment cost index" and their uncertainty play a significant role in the equity market and other markets (Shaikh, 2020). Cakan and Gupta (2017) modeled the impact of U.S. inflation and unemployment rate surprises on South African stock price volatility. The study found that bad news about U.S. inflation does not affect the volatility of South African stock returns, while good news increases volatility. It has also been studied that the country's stock market fluctuates more with an unexpected rise in the U.S. unemployment rate and fluctuates less with an unexpected decline in the U.S. unemployment rate. And even more the last effect being stronger than the former. Thus, an unexpected slowdown in inflation and an increase in the unemployment rate increase stock market instability, which in turn would mean that financial conditions in the country would deteriorate and adversely affect the real economy, according to researchers. Meanwhile, positive surprises in US inflation and employment are contributing to more stable, and therefore less volatile, stock markets in developing countries.

Researchers Nadleri and Schmidti (2016) analyzed the response of the ETF's price to macroeconomic surprises spanning the period from January 2009 until July 2013. It was found that the average daily return of the ETF's on the days of publication of indicators may be significantly higher than the buy-and-hold strategy, although their difference may be statistically insignificant. It was observed that the surprises of the ISM Manufacturing index of non-agricultural employees Non-Farm Payrolls, International Trade Balance, Index of Leading Indicators, Housing Starts and Jobless Claims have the largest and statistically significant impact to ETF's.

Researchers Chen, et. al. (2015) examine the role of investor attention in planned macroeconomic reports to explain price fluctuations in China's future stock index. It has been observed that the attention of investors, as indicated by the Baidu search index, is the highest in anticipation of the consumer price index. Only the CPI has been found to have a significant short-term impact on the price, liquidity, and volatility of the CSI 300 futures index. In addition, price fluctuations in the CSI index are greater in the face of bad CPI surprises and a period of high inflation.

Researchers Miao, et. al. (2014) analyze the impact of macroeconomic indicators on the futures price of the S&P 500 index. Research confirms a strong correlation between macroeconomic indicators and index price fluctuations. More than 60% of jumps between 10:00 and 10:05 and more than 75% of jumps between 8:30 and 8:35 are related to one or more indicators released at 10:00 and 10:30 respectively. Attention is also drawn to the positive impact of surprises in GDP (GDP), the production price index (PPI), factory orders and CPI, advanced retail sales on the S&P 500 index prices.

Gurgul and Wójtowicz (2014) analyzed the impact of US macroeconomic indicators on the price changes of four Warsaw stock indices (WSE, WIG20, WIG40, WIG80). Stock index price changes were analyzed 1 minute after the indicator appears. Consumer price index, producer price index, indicators were observed to be below expert forecasts and durable goods orders, retail sales, industrial production, number of employees in the non-agricultural sector announcements above expert forecasts are times of good news and have a positive impact on

the price of the WSE stock index. It was also observed that the price of the WIG20 stock index reacts more sensitively than the WIG40, WIG80 indices after the first minute of the news.

U.S. Securities and Exchange Commission is responsible for investor oversight. The mission of the U.S. Securities and Exchange Commission is to protect investors, maintain fair, orderly, and efficient markets, and facilitate capital formation. The world of investing is fascinating and complex, and it can be very fruitful. But unlike the banking world, where deposits are guaranteed by the federal government, stocks, bonds and other securities can lose value. There are no guarantees. By far the best way for investors to protect the money they put into the securities markets is to do research and ask questions.

The laws and rules that govern the securities industry in the United States derive from a simple and straightforward concept: all investors, whether large institutions or private individuals, should have access to certain basic facts about an investment prior to buying it, and so long as they hold it. To achieve this, the SEC requires public companies to disclose meaningful financial and other information to the public. This provides a common pool of knowledge for all investors to use to judge for themselves whether to buy, sell, or hold a particular security. Only through the steady flow of timely, comprehensive, and accurate information can people make sound investment decisions (U.S. Securities and Exchange Commission, 2020).

MiFID II (Markets in Financial Instruments Directive) and MiFIR (Markets in Financial Instruments Regulation) started to apply in January 2018, bringing significant improvements to the functioning and transparency of EU financial markets. Right now, the consultations on improving these legal instruments are taking place. Under MiFID II it is more difficult for national regulatory authorities to waive the pre-trade transparency obligations in respect of listed shares. The pre-trade transparency obligations have been extended to financial instruments other than listed shares. MiFID II distinguishes in this connection between equity and non-equity instruments. Equity instruments are shares, depositary receipts, ETFs, certificates and other similar financial instruments. Non-equity instruments are bonds, structured finance products, emission allowances and derivatives (Busch, 2017). MiFIR introduced wide-ranging pre-trade and post-trade transparency requirements to EU markets.

In United States of America, The Economic Growth, Regulatory Relief, and Consumer Protection Act introduced relaxed rules on financial institutions in year 2018. A revised framework for applying prudential standards for U.S. financial institutions have been established. Still legal regulation in U.S. is quite variegated and complicated. It is believed (Kress, Turk, 2020) that policymakers have effectively ignored potential adverse consequences of looser financial institutions oversight. While reducing examination frequency and reporting requirements will lessen banks' administrative burden, the trade-off will be increased societal costs in the form of excessive risk taking and more frequent bank failures.

Gupta and Reid (2012) in their work investigated the impact of macroeconomic indicator surprises on changes in the price indices of South African industrial stocks. A study conducted using the event study method shows that in the long run, only the surprises of consumer price index (CPI) indicators significantly and negatively affect the return of stock indices. Meanwhile, a study conducted by Bayesian Vector Autoregressive analysis shows that surprises in the production price index (PPI) also have a significant impact on stock index prices. It is true that in the last method, the volatility of the prices of both CPI and PPI stock indices is short-lived - as soon as the indicators appear.

Researchers Harju and Hussain (2011) in their work analyze the impact of macroeconomic indicator's surprises on the largest fluctuations in European indices prices. The authors analyzed the changes in stock index prices 5

minutes after the indicator appears. The findings of the study show that the price volatility of European indices increases significantly with the start of U.S. trading. Unexpected macroeconomic indicators also have a direct and significant impact on the daily returns and changes in European stock indices. According to the researchers, the research suggests that interdependencies in the stock market between the U.S. and Europe should be further explored. Also, strong daily fluctuations in stock indices in the European market have a significant impetus for researchers and investors not only to analyze and model short-term index returns, but also the dynamics of the behavior of financial market participants. The EU has established a comprehensive set of rules on investment services and activities with the aim to promote financial markets that are fair, transparent, efficient, integrated. The first set of rules adopted by the EU helped to increase the competitiveness of financial markets by creating a single market for investment services and activities. They also ensured a high degree of harmonised protection for investors in financial instruments, such as shares, bonds or derivatives (European Commission, 2020).

Hussain (2010) in his own article examined the impact of European and U.S. monetary policy indicator's surprises on indices prices in these markets. Stock indices price changes were analyzed 5 minutes after the indicator appears. The study shows that surprises in monetary policy indicators have a significant impact on the price and volatility of indices. In addition, the author noted that the press conference of the European Central Bank (ECB), which takes place 45 minutes after the same day's monetary policy decisions, also has a significant impact on the price and volatility of European stock indices.

Looking at the scientific literature above, we see that researchers get quite different stock return results with different economic indicators. In some cases, surprises in economic indicators have a positive effect on stock returns, while in others they have a negative effect. All the studies include at least a few indicator surprises and model their impact on stock returns. It has been observed that the results are quite contradictory regarding the industrial production indicator. Researchers agree that, in theory, better-than-expected news on this indicator should have a positive impact on stock returns, but the results are contradictory. Researchers Alexiou, et. al. (2018) found a positive but not statistically significant relationship when examining the impact of industrial output surprises on the stock market. Nadleri and Schmidti (2016), meanwhile, demonstrated that the relationship is negative but insignificant. Other researchers Chen, et. al. (2015) found a negative and at the same time statistically insignificant relationship when examining the Chinese stock market. In the European market, according to U.S. the surprise of the industrial production indicator, researchers Gurgul and Wójtowicz (2014) and Harju and Hussain (2011) obtained positive and statistically significant results. Thus, as can be seen, the results are quite contradictory, therefore, in the opinion of the authors, it would be relevant to examine the surprises of this indicator separately from other indicators. Also, as can be seen, many researchers study U.S. indicator's and its markets, but a few is done on the European indicators and its market, so in this study we are going to modeling European stock market returns based on European industrial indicator.

Moving on to a more detailed analysis of researches mentioned above it is worth presenting the methods used by scientists on this topic.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Table 1. Stock price returns analysis methods based on economic indicator's surprises

Years	Authors	Research period	Data frequency	Research methods (in short)
2018	Alexiou, et. al.	1998 - 2017	Daily	- REGRESSION (OLS) - SUR - MM WEIGHTED LEAST SQUARES
2017	Cakan, Gupta	1994 - 2016	Daily	- GJR-GARCH
2016	Nadleri, Schmidti	2009 - 2013	Daily	- ARMA – GARCH
2015	Chen, et. al.	2011 - 2014	Minute	- REGRESSION
2014	Miao, et. al.	2003 - 2010	Minute	- REGRESSION
2014	Gurgul, Wójtowicz	2007 - 2013	Minute	- ES - ARMA
2012	Gupta, Reid	2002 - 2011	Daily	- BVAR - REGRESSION - ES
2011	Harju, Hussain	2000 - 2006	Minute	- ARMA – GARCH
2010	Hussain	2000 - 2008	Minute	- ARMA – GARCH

*REGRESSION (OLS) – regression analysis ordinary least square method
*GJD - Generic jump-diffusion method
*GARCH - Generalized Autoregressive Conditional Heteroskedasticity method
*ARMA - Autoregressive–moving-average method
*ES - Event studies method
*BVAR - Bayesian Vector Autoregressive method

Source: compiled by the authors based on the above sources

The table 1 above shows that the average period of research is 9 years. Thus, the developed models cover several periods of the economic cycle, which is good because ups and downs are estimated. By data frequency, authors collect daily and minute stock price data. The choice of data frequency type usually depends on whether data is easy to obtain. Usually use more frequency data leads to the more reliable models. Thus, according to the above-mentioned studies, the most objective models are based on per-minute stock price data. From table above was noticed that many researchers are calculating surprise indicator which shows how economic announcements impact stock price returns (see Formula 1)

$$S_{k,t} = \frac{A_{k,t} - E_{k,t}}{\hat{\sigma}_k} ; \quad \hat{\sigma}_k = \sqrt{var(A_{k,t} - E_{k,t})} ; \quad (1)$$

From here:
$S_{k,t}$ - standardized surprise value of the economic indicator k, on the trading day t.
$A_{k,t}$ - the actual value of the economic indicator k, on the trading day t.
$E_{k,t}$ - the predictive value of the economic indicator, which is obtained by interviewing experts, household, or business.
$\hat{\sigma}_k$ - standard deviation of the surprise value of the economic indicators k.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Although as we can see from table 2 the methods are diverse, the authors usually choose regression analysis or ARMA-GARCH methods to do their research. The ARMA-GARCH model is usually used to analyze continuous time series when the model equation also includes fluctuations the values of a variable for a previous period. For this reason, this method is not suitable for this case because past stock price returns are not examined in this work. Therefore, one of the research methods chosen in this study is the least square method (OLS). The second method that the authors have chosen and that is innovative is the machine learning method. It is a method belonging to the class of artificial intelligence methods, which is characterized not by a direct solution of the problem, but by learning. None of the mention scientists have used this method and this is a novelty of this study. The use of these two methods will allow to choose and understand which, the model is better on this problem

Research limitation / assumption: We assume that only surprises in economic indicators can affect stock returns and other factors are not included in the model.

3. Research methodology

Regression analysis is used to investigate the dependence of one variable on one or more variables and to predict subsequent mean values of the variables. To construct regression models, it is necessary to perform whether a data is passing regression analysis assumptions.
1. Whether the dependent variable is normally distributed. In this paper we are using Shapiro-Wilk test. A test p value of ≥ 0.05 indicates that the standardized errors are normal.
2. Whether the residual errors of the different observations are not correlated. In this paper Durbin-Watson statistic are used. If the value obtained is between 1.5 and 2.5, it usually means no autocorrelation.
3. Whether the regressors correlate with each other. In this paper we are NOT calculating variance reduction coefficient (VIF) because we have just one regressor.
4. Whether there are outliers in the data. In this paper the Cook measure is calculated. Cook measure calculated for each set of regressors. If the sample size is n, then the cook's measure will be n as well. If the value of n of at least one cook measure exceeds 1, it is said that there are outliers in the data.
5. Whether the data are homoscedastic. In this paper we calculated by the Breusch-Pagan test. If the test p value is ≥ 0.05 then the data are homoscedastic (no heteroskedasticity).

After checking whether the data are suitable for constructing a regression model, the model itself is further constructed. The regression model is usually described by the following indicators:
1. Coefficient of determination (R^2). This is the most important indicator of model confidence in the data, which is mandatory in all descriptions of regression models. The interpretation of R^2 is as follows - what percentage of Y's behavior is explained by the behavior of the variables X, Z, W. The coefficient of determination values acquires between 0 and 1. The higher value indicates more reliable model.
2. T - (Student's) test for each regressor. It helps to decide if a regressor is statistically significant or not. If the value of the regressor p is <0.05, then we can say that the regressor is statistically significant and we do not delete it. If the value of the regressor p is ≥ 0.05, then the regressor is statistically insignificant and we remove it from the model.

The EURO STOXX 50 stock index price returns were modeling in this paper. The analysis period between 2008-02-29 - 2019-10-01, and the frequency of the data is minutes. The data was obtained from the Bloomberg terminal, which includes the following information: index opening price and closing price. Having the closing and opening price of an index minute, it is possible to calculate the price return of an index for a specific minute, which is the dependent variable of the model to be predicted. The return on the index is calculated further

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

$$G_m = \frac{U_m - A_m}{A_m} \times 100 \qquad (2)$$

From here:

G_m % – EURO STOXX 50 index return on minute (m).

U_m – EURO STOXX 50 index close price on minute (m).

A_m – EURO STOXX 50 index open price on minute (m).

As mentioned before EURO STOXX 50 stock price returns are modeling which is based on Industrial production surprises. This indicator reflects the state of the industrial sector. The industrial sector includes manufacturing, mining, and utilities. Although these sectors account for only a small share of GDP, they are highly sensitive to interest rates and consumer demand. This makes the industrial production index an important tool for forecasting future GDP and economic activity.

Moving on to the design of the empirical research, it involve three stages. In the first step, correlation matrices are developed that show the biggest relationship between the surprise indicator and the price returns of the index. In this way, it is possible to decide at which minute, after the announcement of industrial production, the surprise indicator and the index price return correlate the most. To make the models as accurate as possible, correlation matrices are created in five scenarios:

a) Included all surprise values
b) When surprise value > 0
c) When surprise value >= 0
d) When surprise value < 0
e) When surprise value <= 0

The aim of this split is to obtain as much refined and filtered correlation information as possible, which will then allow more reliable regression models to be developed under the five contingency scenarios.

Further regression models are selected according to these criteria:

a) $R^2 >= 0$.
b) Industrial production p-value < 0,05.
c) Count of events > 20.

In the second step of this study, these regression models are tested to see whether they meet the assumptions of the regression analysis discussed above. The remaining models are analyzed. In the third step of the research, by applying the artificial intelligence method, we create new regression models based of the machine learning method, which are compared with the previously developed models.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

4. Empirical research results

Following the methodology described above, the table 2 table presents regression models with ten different surprise values scenarios with the highest index price returns correlation between.

Table 2. Industrial production regressions models

Economic indicator	Regression model	R^2	R^2 in minute	P-value	Count of events	Scenario
Industrial Production (Y/Y)	Index return Chg % = -0.0069 + 0.0218 * surprise	6,00%	3	0,004	140	All
Industrial Production (Y/Y)	Index return Chg % = -0.0071 - 0.0238 * surprise	2,50%	13	0,063	140	All
Industrial Production (Y/Y)	Index return Chg % = -0.1040 + 0.1745 * surprise	24,70%	40	0,000	61	>0
Industrial Production (Y/Y)	Index return Chg % = -0.0949 + 0.1401 * surprise	13,90%	43	0,004	59	>0
Industrial Production (Y/Y)	Index return Chg % =-0.0876 + 0.1705 * surprise	21,80%	42	0,000	70	>=0
Industrial Production (Y/Y)	Index return Chg % =-0.0641 - 0.1159 * surprise	10,10%	43	0,008	69	>=0
Industrial Production (Y/Y)	Index return Chg % =0.0395 - 0.0658 * surprise	7,00%	20	0,026	70	<0
Industrial Production (Y/Y)	Index return Chg % = 0.0514 - 0.0454 * surprise	1,60%	31	0,288	71	<0
Industrial Production (Y/Y)	Index return Chg % = 0.0204 - 0.0531 * surprise	4,60%	20	0,059	79	<=0
Industrial Production (Y/Y)	Index return Chg % = 0.0363 - 0.0357 * surprise	1,10%	31	0,354	81	<=0

Source: created by the author

These regression models can be economically interpreted as follows: What change in the price return of the EURO STOXX 50 index can be expected at a given minute when economists have correctly or incorrectly predicted the actual values of the Industrial production indicator.

The value of R^2 indicates the percentage of the economic indicator surprise that explains the change in the return of EURO STOXX 50 in given minute. The table shows the minute at which the maximum R^2 value was recorded in 45 minutes. The P-value indicates whether the indicated regression model is statistically reliable. If the p-value estimate is less than 0.05, then the model is considered statistically reliable.

Only two models meet the research assumptions. This is R^2 > 20%, p-value less than 0.05, and number of events more than 20. In this case, in this scenario, this study will be continued only with these indicators.

In the next stage of the study, the remaining models is checked to see if they meet the assumptions of the regression analysis.

Table 3. Verification of the regression model assumptions on Industrial production (Y/Y) indicator in scenario >0

Assumptions of regression model	Results of assumption / method
1. Is the dependent variable normally distributed?	**Yes** Shapiro-Wolf p-value equal 0,63
2. Are the residual errors of different observations correlated (autocorrelation problem)?	**No** Durbin-Watson value equal 1,979
3. Is there no multicollinearity between the regressors?	**Not relevant in this paper**
4. Are there outliers to the data?	**No** All Cook values do not exceed 1
5. Is the data homoscedastic?	**Yes** Breusch-Pagan p-value equal 0,30

Source: created by the authors

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

As we can see from table 3 above the model meets all the assumptions required for the regression analysis, therefore it can be stated that the developed model is statistically reliable to predict the returns of the EURO STOXX 50 index.
The next model regression analysis assumption in another scenario is checked further.

Table 4. Verification of the regression model assumptions on Industrial production (Y/Y) indicator in scenario >=0

Assumptions of regression model	Results of assumption / method
1. Is the dependent variable normally distributed?	**Yes** Shapiro-Wolf p-value equal 0,64
2. Are the residual errors of different observations correlated (autocorrelation problem)?	**No** Durbin-Watson value equal 1,866
3. Is there no multicollinearity between the regressors?	**Not relevant in this paper**
4. Are there outliers to the data?	**No** All Cook values do not exceed 1
5. Is the data homoscedastic?	**Yes** Breusch-Pagan p-value equal 0,14

Source: created by the authors

As we can see from table 4 above the model meets all the assumptions required for the regression analysis, therefore it can be stated that the developed model is statistically reliable to predict the returns of the EURO STOXX 50 index.

Turning to the analysis of the Industrial production indicator and EURO STOXX 50 index, a figure 1 was created which contains information of EURO STOXX 50 price returns and Industrial production surprises values which are > 0
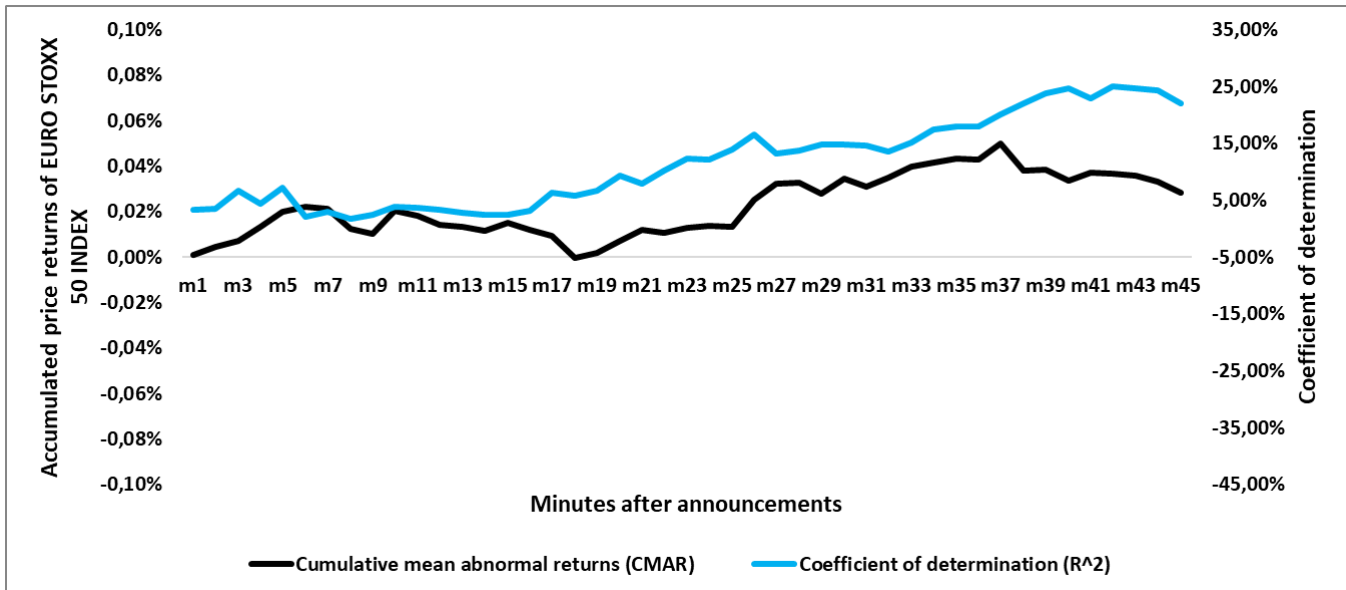
Figure 1. EURO STOXX 50 price returns analysis based on Industrial production surprises in scenario > 0

Source: created by the authors

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

Assessing the impact of this indicator on the price return of the index, both Figure 1 and Table 3 show that under the positive surprise values scenario, its impact on the price return on the EURO STOXX 50 index is positive (index price return increases). As we can see, the highest values of CMAR and R ^ 2 are seen between 31 and 40 minutes. It is difficult to justify economically why this is so, as it can be influenced by many factors. One of them is the behavior of market participants in connection with the fact that forecasts have been confirmed and decisions on purchase or sale transactions do not need to be made very quickly.

Best coefficient of determination for the regression model is 24.70%. From a statistical point of view, this is a relatively small value, which explains approximately one quarter of the return on the EURO STOXX 50 index at 40 minute. However, from an economic point of view and knowing that stock markets are multifaceted and affected by huge flows of information, events, moods, speeches, and so on. - this percentage is quite high and weighty. If a quarter of the return on an index can be explained by only one economic indicator, then by extending the research to include more indicators or factors, this percentage should increase.

Turning to the analysis of the second model, a figure 2 was created which contains information of EURO STOXX 50 price returns and Industrial production surprises values which are >= 0 .
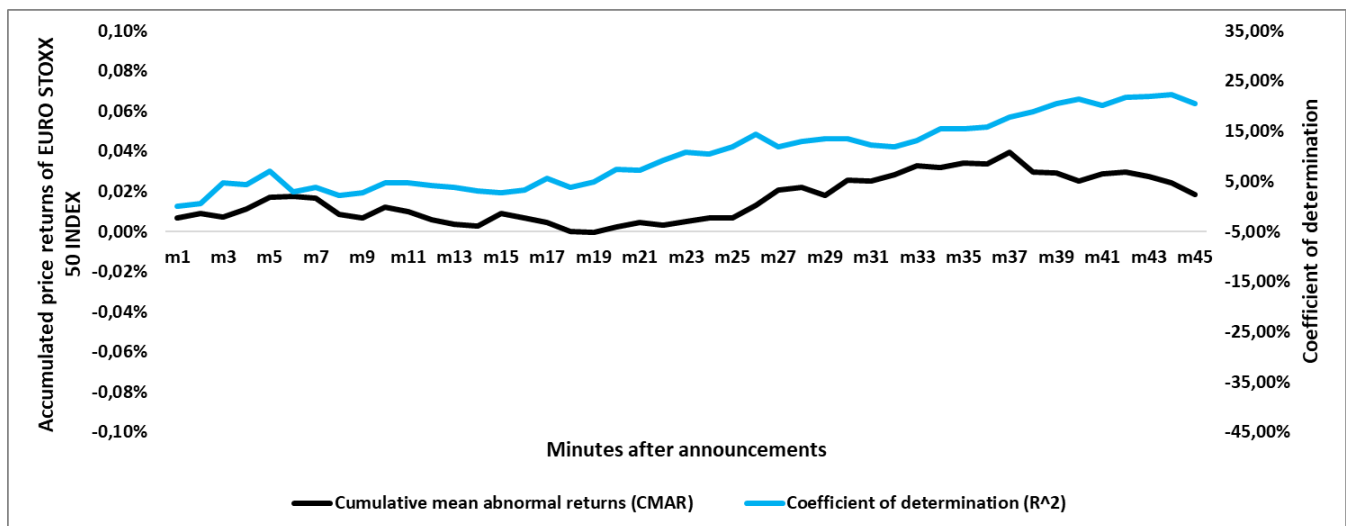
Figure 2. EURO STOXX 50 price returns analysis based on Industrial production surprises in scenario >= 0

Source: created by the authors

Assessing the impact of this indicator on the price return of the index, both Figure 2 and Table 3 show that under the positive surprise values scenario, its impact on the price return on the EURO STOXX 50 index is positive (index price return increases). As we can see, the highest values of CMAR and R ^ 2 are seen last 15 minutes. It is difficult to justify economically why this is so, as it can be influenced by many factors. One of them is the behavior of market participants in connection with the fact that forecasts have been confirmed and decisions on purchase or sale transactions do not need to be made very quickly.

Best coefficient of determination for the regression model is 21.80%. From a statistical point of view, this is a relatively small value, which explains approximately the fifth of the return on the EURO STOXX 50 index at 42

1315

minute. However, from an economic point of view and knowing that stock markets are multifaceted and affected by huge flows of information, events, moods, speeches, and so on. - this percentage is quite high and weighty. If a quarter of the return on an index can be explained by only one economic indicator, then by extending the research to include more indicators or factors, this percentage should increase.

Last part of the empirical research - the comparison between the already shown models and the newly developed artificial regression models. This method is innovative and has not been performed often, therefore it is relevant to investigate which EURO STOXX 50 price return models can be obtained using this method.

Table 5. Comparison between ML and Basic regression analysis models

Economic indicator	Regression model	R^2	R^2 in minute	Count of events	Scenario
Industrial Production (Y/Y) basic model	Index return Chg % = -0.1040 + 0.1745 * surprise	24,70%	40	61	>0
Industrial Production (Y/Y) ML model	Index return Chg % = - 0.0819 + 0.1365 * surprise	33,22%	40	21	>0
Industrial Production (Y/Y) basic model	Index return Chg % =- 0.0876 + 0.1705 * surprise	21,80%	42	70	>=0
Industrial Production (Y/Y) ML model	Index return Chg % = - 0.0589 + 0.0968 * surprise	26,60%	42	25	>=0

Source: created by the authors

From table 5 can be seen that the values of the coefficients of the ML regression model differ from the base model. The effect on index returns remains the same - positive. In the ML model number of events is much smaller due to the data had to be broken down into training and testing sets. The coefficient of determination differs significantly between models. This indicates that even with smaller count of events, ML model can provide better explaining of EURO STOXX 50 price returns.

The results of this work confirm the theoretical assumption that better-than-expected news on industrial production has a positive effect on stock returns. Similar results were obtained by the researchers Gurgul and Wójtowicz (2014) and Harju and Hussain (2011), but the coefficients of determination cannot be compared because the researchers examined not one but several indicators.

Given how fast basic and maching learning is evolving, the regulatory framework should leave room to serve for further developments. Any changes should be limited to clearly identified problems for which feasible solutions exist. This kind of approach can be also found, for instance, in EU Commissions White Paper on Artificial Intelligence (COM 2020 (65) final, 19.2.2020), also in Executive order of USA President on "Maintaining American Leadership in Artificial Intelligence" (Issued 11.02.2019).

Conclusions

From the scientific literature analysis, we see that researchers get quite different stock return results with different economic indicators. In some cases, surprises in economic indicators have a positive effect on stock returns, while in others they have a negative effect. It has been observed that the results are quite contradictory regarding the industrial production indicator. Researchers agree that, in theory, better-than-expected news on this indicator should have a positive impact on stock returns, but the results are contradictory. Therefore, this indicator was chosen for this analysis. Simple regression analysis (OLS), GJR-GARCH, ARMA-GARCH, SV, GJD, ES, BVAR methods are used to model the impact of economic indicators on changes in stock price returns. The most

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

common of these are the least squares regression analysis method and the ARIMA-GARCH methods. The ARMA-GARCH model is usually used to analyze continuous time series when the model equation also includes fluctuations the values of a variable for a previous period. For this reason, this method is not suitable for this case because past stock price returns are not examined in this work. Therefore, one of the research methods chosen in this study was the least square method (OLS). The second method that the authors have chosen and that is innovative is the machine learning method. The use of these two methods will allow to choose and understand which, the model is better on this problem

A methodology includes three stages of data analysis and modeling. In the first stage, correlation matrices are developed that show the biggest relationship between the surprise indicator and the index price returns. In this way, it is possible to decide at which minute, after the announcement of industrial production, the surprise indicator and the index price return correlate the most. To make the models as accurate as possible, correlation matrices are created in five scenarios. In the second stage of this study, the regression models are created and tested to see whether they meet all assumptions. The remaining models are analyzed. In the third stage of the research, by applying the artificial intelligence method, we create new regression models based of the machine learning method, which are compared with the previously developed models.

Total 10 regression models were constructed. Of those, 2 met all assumptions. Model statistics shows that the coefficient of determination is respectively equal to 24.70% and 21.80%. Trying to evaluate the value of the coefficient of determination from a statistical point of view, this is a relatively small value, which explains approximately one quarter of the return on the EURO STOXX 50 index in specific 40 and 42 minute. However, from an economic point of view knowing that stock markets are multifaceted and affected by huge flows of information, events, moods, speeches, and so on. - this percentage is quite high and weighty. If a quarter and fifth of the return on an index can be explained by only one economic indicator, then by extending the research to include more indicators or factors, this percentage should increase. Correlation matrix show that the higher values of the coefficient of determination are visible in the last five minutes. This indicates that the surprise values of the indicators have lagged but longer impact on stock price returns over all period. Thus, the opportunity to take a profit raise. In the end of the research machine learning method was applied to create new regression models on purpose to compare with base models. Results show that the values of the coefficients of the ML regression model differ from the base model. The effect on index price returns remains the same - positive. In the ML model number of events is much smaller due to the data had to be broken down into training and testing sets. The coefficient of determination differs significantly between models respectively 33,22% and 26,60%. This indicates that even with smaller count of events, ML model can provide better explaining of EURO STOXX 50 price returns. Stock regulation in both the US and Europe is an evolving process that depends not only on economic factors and technological development, but also on political will. The development of artificial intelligence will certainly have a positive impact on the stock institute not only in economic, but also in legal terms. The rules for financial institutions which systematically internalise have become more detailed and the pre-trade and post-trade transparency obligations have been extended to financial instruments other than listed shares in EU. In USA on the contrary, the rules on the financial institutions have been relaxed in recent years. European and the US markets depend on how legal regulation affects the trading process. Although they are both intend to promote competition in markets, EU and U.S. adopt different provisions with respect to main that strongly influence the competition for order flow among trading venues.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

References

Abed, R. E., Zardoub, A. (2019). Exploring the nexus between macroeconomic variables and stock market returns in Germany: An ARDL Co-integration approach. *Theoretical and Applied Economics* XXVI 2(619), Summer, 139-148.

Alexiou, C., Vogiazas, S., Taqvi, A. (2018). Macroeconomic announcements and stock returns in US portfolios formed on operating profitability and investment. *Investment Management and Financial Innovations* 15(1), 68 - 89. http://doi.org/10.21511/imfi.15(1).2018.08

Altinkilic, O., Hansen, R. S., Ye, L. (2015). Can analysts pick stocks for the long-run? *Journal of Financial Economics*. Retrieved from: http://ssrn.com/abstract=1787707

Busch. D. (2017). MiFID II and MiFIR: stricter rules for the EU financial markets. *Journal Law and Financial Markets Review* 11, 126-142.

Cakan, E., Gupta, R. (2017). Does the U.S. macroeconomic new make the South African stock market riskier? *The Journal of Developing Areas* 51 (4), 16 - 27.

Chen, J., Liu, Y., Lu, L., Tang, Y. (2015). Investor attention and macroeconomic news announcements: evidence from stock index futures. *The Journal of Futures Markets* 36 (3), 240–266. http://doi.org/10.1002/fut.21727

European Commission (2020). White Paper on Artificial Intelligence: a European approach to excellence and trust. Retrieved from: https://ec.europa.eu/info/publications/white-paper-artificial-intelligence-european-approach-excellence-and-trust_en

European Commission (2020). Investment services and regulated markets – Markets in financial instruments directive (MiFID). Retrieved from: https://ec.europa.eu/info/business-economy-euro/banking-and-finance/financial-markets/securities-markets/investment-services-and-regulated-markets-markets-financial-instruments-directive-mifid_en

Fama, E. F., French, K. R. (2015). A five-factor asset pricing model. *Journal of Financial Economics* 116 (1), 1–22.

Gupta, R., Reid, M. (2012). Macroeconomic Surprises and Stock Returns in South Africa. *Stellenbosch Economic Working Papers*: 05/12. Retreived from: https://ideas.repec.org/p/sza/wpaper/wpapers157.html

Gurgul, H., Wójtowicz, T. (2015). The Response of Intraday ATX Returns to U.S. Macroeconomic News. Finance a úvěr-Czech. *Journal of Economics and Finance*, 65(3), 230 - 253.

Harju, K., Hussain, S.M. (2011). Intraday Seasonalities and Macroeconomic News Announcements. *European Financial Management*, 17 (2), 367-390. http://doi.org/10.1111/j.1468-036X.2009.00512.x

Harju, K., Hussain, S. M. (2011). Intraday Seasonalities and Macroeconomic News Announcements. *European Financial Management*, 17 (2), 367 - 390. http://doi.org/10.1111/j.1468-036X.2009.00512.x

Ho S.Y. (2018). Macroeconomic determinants of stock market development in South Africa. *International Journal of Emerging Markets*. ISSN: 1746-8809. http://doi.org/10.1108/IJoEM-09-2017-0341

Hussain, S. M. (2010). Simultaneous monetary policy announcements and international stock markets response: an intraday analysis. *Bank of Finland Research* Discussion Papers 8. Retrieved from: https://ideas.repec.org/p/bof/bofrdp/2010_008.html

Yen, G., Lee, C. F. (2008). Efficient market hypothesis (EMH): Past, present and future, *Review of Pacific Basin Financial Markets and Policies* 11(2), 305–329.

Kozel, V. (2015). Finansinės elgsenos principų taikymo investiciniams sprendimams priimti teoriniai aspektai. 18-osios Lietuvos jaunųjų mokslininkų konferencijos „Mokslas – Lietuvos ateitis" teminė konferencija, 248. [Theoretical aspects of the application of financial behavior principles to investment decisions. Thematic conference of the 18th Lithuanian Young Scientists Conference "Science - the Future of Lithuania", 248.]

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Kress, J.C., Turk, M. (2020). Too Many to Fail: Against Community Bank deregulation. *Northwestern University Law Review* 115, 3 - 70.

Masood, O., Javaria, K., Petrenko, Y. (2020). Terrorism activities influence on financial stock markets: an empirical evidence from United Kingdom, India, France, Pakistan, Spain and America. *Insights into Regional Development*, 2(1), 443 - 455. http://doi.org/10.9770/IRD.2020.2.1(4)

Miao, H., Ramchander, S., Zumwalt, J. K. (2014). S&P 500 index-Futures price jumps and macroeconomic news. *The Journal of Futures Markets*, 34 (10), 980–1001. http://doi.org/10.1002/fut.21627

Nadleri, D., Schmidti, A. B. (2016). Impact of Macroeconomic Announcements on US Equity Prices: 2009–2013. *Journal of Forecasting, J. Forecast*. 35, 34 - 42. http://doi.org/10.1002/for.2359

Nawrocki, D., Viole F. (2014). Behavioral finance in financial market theory, utility theory, portfolio theory and the necessary statistics: A review. *Journal of Behavioral and Experimental Finance* 2, 10 - 17.

Pasquariello, P. (2014). Prospect Theory and market quality, *Journal of Economic Theory* 149, 276 - 310.

Shaikh, I. (2020). Does policy uncertainty affect equity, commodity, interest rates, and currency markets? Evidence from CBOE's volatility index. *Journal of Business Economics and Management*, *21*(5), 1350 - 1374. http://doi.org/10.3846/jbem.2020.13164

Tetteh, J. E., Adenutsi, D. E., Amoah, A. (2019). The Determinants of Stock Market Return in Ghana: FMOLS and DOLS Approaches. *The IUP Journal of Applied Finance*, 25 (4), 6 - 26.

U.S. Securities and Exchange Commission (2020). What we do. Retrieved from: https://www.sec.gov/Article/whatwedo.html

White House (2019). Executive Order on Maintaining American Leadership in Artificial Intelligence. Retrieved from: https://www.whitehouse.gov/presidential-actions/executive-order-maintaining-american-leadership-artificial-intelligence/

Zhai, X. Ying, Hou, Y. Ying, Li, Y. Shun. (2020). Investor attention and stock returns under negative shocks: an empirical analysis based on "Dragon and Tiger" list in China. *Journal of Business Economics and Management*, 21(3), 914 - 941. http://doi.org/10.3846/jbem.2020.11836

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES:@Entrepr69728810

dr. Ligita GASPARĖNIENĖ is a Head of Research and Innovation Department, Vilnius University, the leader of the national project "Welfare society". Research interests: shadow economy, digital shadow economy, corruption, money laundering, investments in gold, monetary policy.
ORCID ID: https://orcid.org/0000-002-5535-6552

dr. Rita REMEIKIENĖ is a Project leader of Research and Innovation Department, Vilnius University, the senior researcher of the national project "Welfare society". Research interests: shadow economy, digital shadow economy, corruption, money laundering, self-employment.
ORCID ID: https://orcid.org/0000-0002-3369-485X

Aleksejus SOSIDKO is the Phd student of Faculty of Business and Economics, Mykolas Romeris University, LT. Research interests: Fundamental analysis, stock market analysis, machine learning.
ORCID ID: https://orcid.org/0000-0002-0438-668X

dr. Vigita VĖBRAITĖ is assoc. professor at Vilnius University Faculty of Law (Department of Private Law). Research interests: private law, civil procedure, electronic justice, alternative dispute resolution.
ORCID ID: https://orcid.org/0000-0003-4351-061X

Evaldas RAISTENSKIS is a junior researcher at Vilnius University, Faculty of Law, Department of Criminal Justice, Criminal Law General Science Center. I am currently writing a dissertation work for Criminal Liability for Contraband. Research interests: criminal smuggling, shadow economy, corruption.
ORCID ID: https://orcid.org/0000-0003-3049-2926

THE CONCEPT OF GLOBAL GOVERNANCE IN TOURISM FRANCHISES: A CASE STUDY OF TUI GROUP

Asad H. Aburumman

University of Sharjah, 27272 Sharjah, United Arab Emirates

E-mails: asadaburumman34@gmail.com

Abstract. The study characterizes the global corporate governance in the context of tourism. Risks the TUI Group would face during the implementation of the global governance strategy were assessed. The analysis of management and operational risks revealed that in conditions of global economic uncertainty tourism companies may use risk diversification to ensure flexibility. The risk likelihood assessment justified the need for the use of innovative management models with the aim of reducing the likelihood and impact of risks. An organizational-managerial framework for risk diversification was established that enables companies to cope with the global challenges in a synergistic effort. Finally, the study explored the socio-economic impact of global governance strategy on the competitive regional tourism

1. Introduction

Globalization has broadened the horizons of business markets, increased competition and technological advances. To achieve their presence on the global platform and stimulate international trade, organizations consistently make efforts to adopt global management tactics. It has become imperative for transnational organizations to be strategically effective by developing synergies between operations, capital and human resources (Bhullar, 2018).

In the aftermath of the 2008 financial crisis, discourses have emerged around variation in risk management, highlighting the interconnected role of business cycles, as well as derivative markets and geopolitical fragmentation (Han et al., 2019). Traditionally, the diversification process has been considered the most effective

way to reduce corporate risk (Sun et al., 2020). Implementation of a diversification strategy is a resource-intensive activity, therefore, determining the determinants of an effective strategy is necessary for global project managers to make more informed decisions in the management of companies (Shao et al., 2020).

The tourism services market transnationalizes in response to the current trends of the global tourism industry, giving room to international tourism complexes. National economies and social systems of different countries hence become interdependent and the international trade intensified. To regulate global problems in the tourism industry, international institutions were established that adapt relative standards and principles of international tourism.

The history of transnational tourism began in the mid 80-ies of 20th century with the internalization of the service industry (Skarga, 2018). A network marketing business model of interaction between tour operators and travel agents that was employed during that period allows acquiring a regular customer base and gaining control over the consumer market in remote destinations. Since the 90s, the network of tourist multinationals has been dynamically developing that are capable of effectively managing a set of tourism brands in the international tourism market as well as a tourism infrastructure (Dovgal, 2014). Under the auspices of tourism multinationals, an unrelated diversification strategy emerged (Duginets, 2017) that provides for the active cooperation with other industries such as food, retail, transport, media and information technology.

Transnationalization of the tourism market resulted in a tremendous growth in mergers and acquisitions (M&A) at the end of 90s (horizontal integration) (Dangi & Jamal, 2016). The consolidation of tourism entailed regional expansion and the emergence of conglomerate structures with related diversification (vertical integration). The restructuring of the global tourism industry took place with the penetration of new industries such as transport, banking, insurance, advertising, trade, and production. Furthermore, new destinations were introduced. In the context of globalization, European and British tour operators like TUI (Germany), Thomas Cook (Germany), My Travel (UK), Rewe Touristic (Germany), First Choice (UK), Kuoni (Switzerland), Grupo Iberostar (Spain), Club Med (France), Alltours (Germany), and Hotelplan (Switzerland) serve as an example of vertical and horizontal integration (Skarga, 2018). At the end of the 20th century, these companies acquired dominance in the European tourism market.

TUI Group is a German travel company, originated from the industrial and transportation organization. In the mid-nineties, the company turned its gears towards tourism and shipping, partly selling its industrial groups to acquire several large travel and transport companies. After the merger with a British subsidiary of TUI Travel in 2014, TUI Group became the world's largest travel business: many tour operators with leading positions in their own domestic markets are gathered under its roof. In Germany, they include TUI Deutschland, 1-2-FLY, airtours and Wolters Reisen; in the UK, Thomson and First Choice. TUI operators are also among the leading national brands in Austria, Poland, Switzerland, Denmark, Finland, Norway, Sweden, France, Belgium, the Netherlands, China, Russia and Ukraine. The TUI Group's Global governance Strategy drives on four specific strategic initiatives (Tui Group, 2019a).

Markets & Airlines: maintain strong market positions. In 2019, Markets & Airlines business experienced a number of external challenges such as potential Brexit and two 737 MAX crashes in Indonesia and Ethiopia. These events, the Boeing 737 MAX ban specifically, caused an 85% reduction of net profit in the third quarter of 2019. Therefore, the company's strategic goals were market consolidation in the Markets & Airlines sector and solution to structural problems. The company seeks to improve flexibility and cost position, facilitate innovation, and promote centralized IT processes. These initiatives will enable the expansion of product offering beyond

accommodation-only packages while remaining competitive, maintaining the leading market positions, and supporting the airline asset management system.

Hotels & Cruises: expansion at scale, driving returns by benefiting from vertical integration. With 411 hotels, TUI Group has built a large and highly profitable hotel business (with a return on invested capital of 14%). Hotels & Cruises business is closely linked to Markets & Airlines by virtue of benefits from vertical integration. According to the company's strategic plans, TUI will continue to invest in portfolio expansion and risk diversification through joint venture structures. It is planned to accelerate the growth of the TUI Blue brand to 100 hotels by the end of 2020 using a franchise partnership system. The key investment focus area are the Caribbean, South East Asia and Africa.

GDN-OTA platform: building a digital distribution platform based on competitive pricing to attract consumers. The new strategy relates to new markets: China, India and Brazil. The platform will focus on the asset-light business model. As the hotel and cruise portfolio grows, the TUI expands its digital capabilities. The company has ambitious plans for engaging hotels that previously had no collaborative relationships with it. TUI plans to surpass its competitors by offering attribute-based booking services and expanding the range of service offering to meet customer likings. Since the global hotel chains are accustomed to this technology, TUI may benefit from cooperating with the spa industry. The strategic goal of company's CRM system is to position TUI as a holistic digital hotel service provider by 2022.

Destination experiences platform: building scale in the 'things to do' market. The tours and activities market annually grows approx. 7% with a sales volume of around 150 billion euros. In this market, TUI has built a growing platform business with an impressive range of local tourism products. The TUI business model is based on a two-sided open platform that is accessible for direct booking, distribution colleagues and third parties (i.e., travel services suppliers), connecting company's destination experiences products.

With further growth of the information space, businesses need to improve their business practices and methods as well as to find effective ways of gaining competitive advantages. Organizational-managerial innovations based on online platforms and new forms of partnerships impel international tourism networks towards capacity strengthening.

This paper aims to examine the TUI Group strategy for global governance in the regional context. The following objectives were set to facilitate the achievement of this aim:
— Characterizing global governance within the context of corporate interactions.
— Exploring organizational and managerial risks of implementing TUI Group strategy for global governance.
— Assessing the likelihood of global and local risks the TUI Group may face with.
— Finding organizational and managerial solutions to reduce the likelihood of these risks materializing and eliminate their destructive impact.
— Building a blockchain-based organizational model of global governance in the tourism business.

Indentifying the socio-economic impact of the Global Governance Strategy on the competitive regional tourism.

2. Materials and methods

Exploring official statistics on the company's performance and development strategy as well as current trends of the global tourism industry, risks of implementing the TUI Group Strategy for Global governance were determined and a diversification solution was found. Methodology for the risk impact assessment consists of four steps: risk identification, risk description, risk assessment and organizational-managerial solution.

Risk identification: management identifies the risks relevant to the pursuit of the strategy within their business area in the context of four risk types, i.e., long-term strategic and emerging threats; medium-term challenges associated with business change; short-term risks due to changes in the external and regulatory environment; and short-term risks associated with internal operations and control.

Risk description: concerns in relation to risks are identified; causal factors that may result in the risk materializing and potential consequences if it does are determined. This allows evaluating the interaction of risks and potential triggers before developing mitigation strategies for causes or consequences.

Risk assessment: The main advantage of assessing the gross risk is that it highlights the potential risk exposure if mitigation fails completely or takes no place at all. Both impact and likelihood are ranked using the criteria given in Table 1.

Table 1. Risk assessment criteria

Impact Assessment				
Minor	**Moderate**	**Significant**	**Major**	**Serious**
Impact on:	*Impact on:*	*Impact on:*	*Impact on:*	*Impact on:*
- financials (sales and / or costs) - reputation; - technology reliability; - compliance; - health & safety standards; - tourism program delivery.	- financials (sales and / or costs) - reputation; - technology reliability; - compliance; - health & safety standards; - tourism program delivery.	- financials (sales and / or costs) - reputation; - technology reliability; - compliance; - health & safety standards; - tourism program delivery.	- financials (sales and / or costs) - reputation; - technology reliability; - compliance; - health & safety standards; - tourism program delivery.	- financials (sales and / or costs) - reputation; - technology reliability; - compliance; - health & safety standards; - tourism program delivery.

Likelihood Assessment				
Rare	**Unlikely**	**Possible**	**Likely**	**Almost Certain**
<10% Chance	10-<30% Chance	30-<60% Chance	60-<80% Chance	≥80% Chance

Source: Developed by the authors based on Tui Group (2019b).

The next step is to assess and document the mitigation to reduce the likelihood of the risk materializing and its impact on company's performance if it does.

Organizational-managerial solution: If the management assesses the current risk score too high, an action plan will be drawn up with the aim of introducing new or stronger measures to reduce the impact and/or likelihood of the risk.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Details on the likelihood and impact of the principal risks to the TUI Group as well as organizational-managerial solutions for their reduction are shown in Figure 1. In the risk assessment, the current risk position relates to the current level of risk faced by TUI and triggered by challenges in the global tourism industry. The target risk position shows the target level of risk after implementing an organizational-managerial mitigation solution. Table 2 showcases a risk management technology relevant to the corporate strategy of the TUI Group.
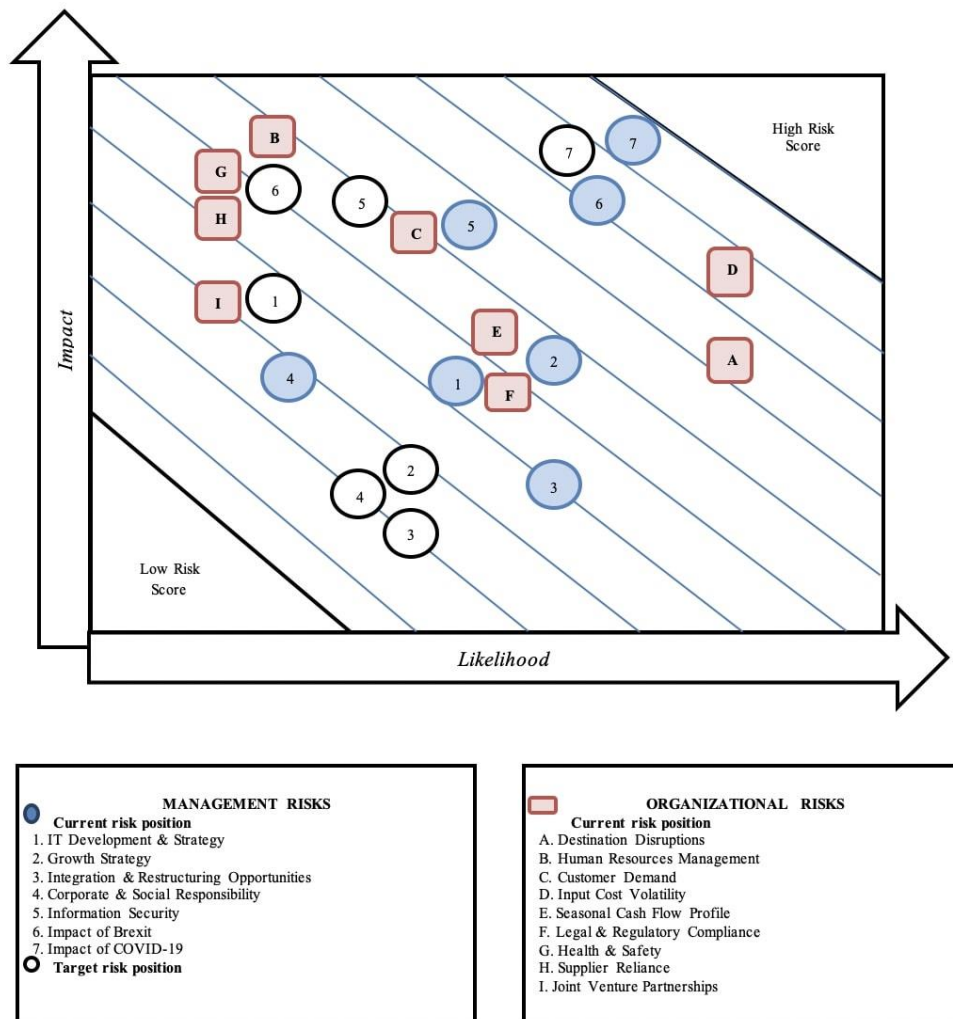
Figure 1. Management and organizational risks to TUI Group, adapted from Tui Group (2019a, 2019b, 2019c)

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Table 2. Risk management under the global governance strategy, adapted from Tui Group (2019a, 2019b, 2019c)

Risk Identification	Risk Description	Impact	Likelihood	Organizational-managerial solution
MANAGEMENT RISKS				
1. IT Development & Strategy	Inability to provide strong technological solutions in the company's markets	Decline in competitiveness, quality and operational efficiency, impacting customer numbers, income and profitability	10-<30% (unlikely)	1. Developing and adapting (in conjunction with Executives, Business and IT teams) the Group's IT strategy which is clearly aligned to the overall business objectives. 2. Implementing the GDN-OTA platform, moving from retail to online to mobile in order to enhance customer experience and conversion. 3. Implementing a SAP-based central customer platform to collate all information on our customers across their journey to provide a single view of the customer alongside an eCRM platform which will support strategic marketing. 4. Placing increased focus on ensuring continuity plans for critical IT systems are in place and regularly tested. 5. Establishing clear technology standards and roadmaps which are linked to target audience and individual market objectives. 6. Adopting API, Big Data and Cloud architecture to improve speed, productivity and efficiency. 7. Using Blockchain to manage hotel bed allocation to be ahead of the competition.
2. Growth Strategy	Non-optimal asset utilization; Failure to achieve some of the initiatives required for overall growth	Decline in profits; Failure to achieve the overall growth targets and the loss of potential markets	30-<60% (possible)	1. Establishing a remuneration mechanism to create incentives for the sustained growth and robust financial performance. 2. Coordinating and monitoring the various growth initiatives. 3. Implementing initiatives to achieve growth with the focus on GDN-OTA sectors as well as adding scale through Destination Experiences with the new tours and activities platform which reduces the risk through diversification. 4. Adhering to investment criteria and authorization processes. 5. Maintaining strong relationships with the providers of aircraft finance. 6. Monitoring the overall market conditions in order to respond to extreme situations and invoke action plans.
3. Integration & Restructuring Opportunities	Challenges in integrating business and reducing the overlapping activities; Challenges in building a leaner and streamlined operating model	Financial and reputational damages	30-<60% (possible)	1. Establishing Markets and Domain Transformation Board to control over the standardization of processes across the markets. 2. Creating strong project management structures for all of the major restructuring, acquisition and disposal programs, designed to ensure the effective management. 3. Generating effective tools for project reporting in order to enhance transparency of project progress. 4. Regular reporting by the major projects to ensure quick resolution of any issues or to enhance coordination across the Group where required.
4. Corporate & Social Responsibility	Failure in upholding corporate and social responsibility standards from suppliers	Failure to achieve some of the initiatives required to sustainably manage tourism; Decline in company confidence;	<10% (rare)	1. Continuing to implement the 'Better Holidays, Better World' 2020 sustainability strategy framework which includes specific targets for key sustainability indicators. 2. Establishing a special sustainability department to collaborate with the business and other stakeholders to implement the sustainability strategy. 3. Operating one of the most carbon-efficient airlines in Europe with continued investment in new, more efficient aircraft (e. g. Boeing 787 Dreamliner & 737 Max) and cruise ships (e. g. the

		Reputational damage; Reduction of demand; and loss of competitive advantage		TUI Cruises and Hapag-Lloyd Cruises). 4. Implementing an environmental management system with airlines that achieved ISO 14001 certification. 5. Increasing measures to influence accommodation suppliers to achieve third party sustainability certification recognized by the Global Sustainable Tourism Council (GSTC). 6. Expanding Care Foundation to focus on the achievement of 2020 target for charitable donations and sustainability projects.
5. Information Security	Increased susceptibility to cyber-attacks and hacks; Inability to ensure an appropriate level of security control across the company	Negative impact on the relationship with the key stakeholders; Reputational damage; Potential for financial implications	30-<60% (possible)	1. Continued support of key initiatives to ensure all existing and future IT systems are secure by design, that exposure to vulnerability is managed effectively, user access is sufficiently controlled and colleagues are made aware of information security risks through appropriate training. 2. Promoting secure behaviors amongst our colleagues through the launch of a company-wide awareness campaign. 3. Continuous review and testing of all external devices and ongoing monitoring of logs in order to identify any potential threats as they arise. 4. Continuous improvement through the experience of real or simulated cyber incidents.
6. Impact of Brexit	Restricted access to European Union's airspace	Operational and financial damage	60-<80% (likely)	1. Establishing a Brexit Steering Committee to monitor developments as the political negotiations take place, assess any impacts on the Group's business model and coordinate suitable mitigation strategies. 2. Lobbying to protect consumer choice in liberalized and deregulated aviation markets.
7. Impact of COVID-19	Restricted international air traffic	Operational and financial damage	≥80% (almost certain)	3. Tracking and assessing COVID-19's impact as well as modeling various action scenarios to support customers, colleagues and stakeholders. 4. Adapting an action plan to reduce costs and mitigate the impact on company's profits.
	ORGANIZATIONAL RISKS			
A. Destination Disruptions	May impact one or more destinations	Damage from operational disruption and increased costs	≥80% (almost certain)	1. Defining crisis management procedures and emergency response plans with the focus being laid on the customer welfare. 2. Expanding destination portfolio with alternative experiences.
B. HR Management	Inability to attract and retain key talent, built leadership capability, and maintain trust of employees.	Challenges in managing and maintaining human resources under the corporate strategy; Decline in shareholder confidence; Inability to maintain a corporate business model	10-<30% (unlikely)	1. Enhancing performance and engagement through performance review, development plans, and career planning process. 2. Developing the International Leadership Program that attracts, develops, and retains high-quality employees. 3. Establishing and maintaining online professional academies to provide employees with learning offerings in specific fields. 4. Promoting strategically aligned leadership academy for high performing management at all levels.
C. Customer Demand	Sensitivity of customer spending power to external factors	Reduction of growth; Margin erosion	30-<60% (possible)	1. Building an integrated business model, whilst positioning the company as a globally operating tourism group (this enables a reduction of competitive threats). 2. Offering new experiences and tourism services to match customer demands and preferences. 3. Building strong and lasting relationships with the key hotel

				partners to develop new concepts. 4. Using scale to reduce costs and make prices competitive. 5. Market diversification in order to reduce the exposure to one particular economic cycle. 6. Promoting the benefits of travelling with a sustainable globally-operating tour operator to increase customer confidence.
D. Input Cost Volatility	Inability to adequately manage the volatility of exchange rates, fuel prices and other input costs; A rigid hedging policy; Change of macroeconomic conditions	Increased costs and margin erosion; Inability to respond to competitive pricing pressures during the season; Impact on exchange rates and the translation of market results into the reporting currency.	60-<80% (likely)	1. Using the appropriate derivative financial instruments to provide hedging of the underlying transactions with fuel and foreign currency. 2. Maintaining an appropriate hedging policy to ensure that the hedging cover is taken out ahead of the customer booking profiles. 3. Tracking the foreign exchange and fuel markets to ensure the appropriateness of the hedging policies.
E. Seasonal Cash Flow Profile	Inability to adequately manage cash balances in the winter low season	Inability to settle liabilities as they fall due whilst ensuring that financial covenants are maintained	30-<60% (possible)	1. Ensuring an even distribution of profit and cash profile across the year. 2. Producing short-term and long-term cash forecasts during the year to manage cash resources effectively. 3. Implementing a financial policy which leads to an improvement in the credit rating and makes it easier to maintain financing capabilities. 4. Maintaining high-quality relationships with the key financiers and monitoring compliance with the financial covenants. 5. Raising additional finance from the capital markets when required.
F. Legal & Regulatory Compliance	Non compliance with laws and regulations	Fines or other sanction from regulatory bodies	30-<60% (possible)	1. Communication and strong position of management regarding the compliance with laws and regulations. 2. Establishing Legal Compliance Committee to ensure appropriate oversight, monitoring and action plans and to further improve the compliance effort across the Group. 3. Embedding legal and tax expertise in all major businesses responsible for maintaining high quality relationships with the relevant regulators and authorities. 4. Ongoing implementation and review of Compliance Management System to monitor compliance with regulations and provide expert advice to local teams on specific compliance areas..
G. Health & Safety	The occurrence of accidents or incidents causing illness, injury or death to customers or colleague on a trip	Reputational damage and/or financial liabilities through legal action being taken by the affected parties	<10% (rare)	1. Establishing health and safety functions in all businesses in order to ensure an appropriate focus on health and safety processes as part of the operating activity. 2. Ongoing monitoring to ensure compliance with minimum standards. 3. Putting appropriate insurance policies to action.
H. Supplier Reliance	Failure in suppliers	Inability to continue the core operations	<10% (rare)	1. Using reputable and financially stable suppliers, particularly in areas where a single supplier is used to provide a service. 2. Regular monitoring of supplier performance against agreed terms and conditions.

				3. Building strong working relationships with all key suppliers.
				4. Attracting more owned and joint venture partner hotels that form a substantial part of the risk reduction program.
				5. Establishing a robust prepayment authorization process to both limit the level of prepayments made and ensure that they are only paid to trusted, credit-worthy counter-parties.
				6. Monitoring prepayments to effectively manage financial risks.
I. Joint Venture Partnerships	Failure of good relationships with key partners; Inconsistency of business objectives	Operational difficulties and jeopardized achievement of financial targets	<10% (rare)	1. Maintaining good working relations with the main joint venture partners as well as commitment to the growth strategy

3. Results

Current and potential risk management is critical to the long-term success of business and integral to corporate management. The process of risk identification, assessment and response is continuous and embedded within the company's operations. It is consolidated, reported and reviewed at varying levels of corporate management on a quarterly basis. This study divides the principal risks to the Group into management and operational sub-categories.

Management risks to TUI Group (Tui Group, 2019c):

1. IT Development & Strategy. The Group aims to improve customer experience by providing appealing and continuous customer service through delivery of digital solutions, innovative platform capabilities, underlying technical infrastructure and IT services required to support the overall strategy for steady corporate growth. An ineffective IT strategy may inhibit the ability of the Group to provide strong technological solutions in its markets. This will therefore affect company's competitiveness, quality and operational efficiency, ultimately affecting customer numbers, income and profitability.

2. Growth Strategy. The strategic positioning of the Group combines its own products with strong multi-channel sales and diversification across destinations. The Group focuses on improving its competitiveness, expanding the range of tourism products, and on developing digital platforms in new markets and destinations. The optimal asset utilization of aircraft, cruise ships and hotels is critical to the financial success of the Group, especially in a growth phase. There is a risk that the Group will not be able to achieve some initiatives and hence the overall growth.

3. Integration & Restructuring Opportunities. The key strategic paradigm of the Group is to act 'as one' wherever possible, particularly through group platforms and across the markets, while maintaining local differences, since the benefits of such differentiation are greater than those of harmonization. Currently, there are a number of restructuring projects being implemented under an active program of acquisitions (e.g., Hotelbeds) and business sales (e.g., Boomerang Reisen and Berge & Meer) with associated integration projects. With restructuring or integration programs, management risks arise that relate to further business integration and reduction of

duplicating factors. Apart from those, there may be challenges in developing an operating model that is more rational and optimized.

4. Corporate & Social Responsibility. For the Group, economic, environmental and social sustainability is a fundamental principle of management and a cornerstone of a strategy for continuously adding value to the company. Therefore, the Group creates the conditions for long-term economic success and takes responsibility for sustainable development in the tourism industry. The company's initiatives are to reduce the environmental footprint of tourism directly, through its own business, and indirectly, through the influence on partners in the supply chain, thereby yielding a positive impact on the quality of life in tourist destinations, their stable growth and development. There is a risk that the company will fail to achieve some initiatives and efficiently manage tourism if suppliers do not comply with its corporate and social responsibility standards. If the Group fails to maximize its positive impact on tourism destinations and minimize the negative impact to the extent that its stakeholders expect, this could result in a confidence decline, reputational damage, decrease in demand, and loss of competitive advantage. Furthermore, if the Group fails to achieve its sustainable development goals and put them in line with those in the UN Paris Climate Change Agreement (December 2015), this could lead to sustained long-term damage to its structure and strategic destinations.

5. Information Security. The Group is responsible for protecting the confidentiality, integrity, and availability of information provided to customers, employees, suppliers, and service delivery teams. This dynamic risk is associated with the increase of global cybercrime activities and new regulations (e.g., the European Union's General Data Protection Regulation). At the same time, consolidation under the TUI brand and growing dependence on online sales and customer care channels (web/mobile devices) increase corporate exposure to cyber attacks and hacks. If the Group does not provide an appropriate level of security control in the corporate system, this could have a negative impact on the interaction with key stakeholders, reputational damage and potential for undesirable financial consequences.

6. Impact of Brexit. The major challenge of the Group is to restrict the airline access to the EU airspace, particularly German and Spanish. This would affect the company's operational and financial activities. Furthermore, the scope of uncertainty includes the status of the UK partners and colleagues and new visa requirements for organizing trips from the UK to the EU.

7. Impact of COVID-19. Responding to the global challenges of COVID-19, the Group decided to suspend the vast majority of travel-related operations, including package tours, cruises and hotel operations. This temporary suspension aims to facilitate the global government efforts to mitigate the proliferation of COVID-19. The major concern of the Group is to limit flights, which could have a strong operational and financial impact.

Operational risks to TUI Group (Tui Group, 2019c):

A. Destination Disruptions. With operations in international markets, the Group is exposed to the risk of unwanted incidents within the tourist destinations, particularly natural disasters such as hurricanes or tsunamis; outbreaks of disease such as COVID-19; the political volatility as has been seen in Egypt, Turkey, and Greece in recent years; war in countries close to company's markets and travel destinations; and terrorist events such as the tragic incident in Tunisia in 2015. There is a risk that if such an undesirable event occurs in a tourist destination, affecting one or several destinations, the Group may potentially suffer from significant operational disruption and increased costs.

B. Human Resources Management. The Group's success depends on its ability to attract, retain and develop talents to deliver high-quality tourism services. There is a risk that the Group will be unable to attract and retain skilled employees, create potential for future leadership capability, and maintain the commitment and trust of its employees. Problems of managing and maintaining human resources under the corporate strategy may negatively impact shareholder confidence and company's ability to maintain a corporate business model.

C. Customer Demand. Travel and tourism expenses are discretionary, price sensitive, and competitive. The economic prospects remain uncertain with various markets at different points in the economic cycle. Furthermore, the recent years saw an emergence of successful alternative business models such as travel websites and hotel portals which allow end consumers to independently combine the individual elements of a trip and book them separately. There is a risk that these external factors will affect the spending power of customers, resulting in slower growth and lower margins.

D. Input Cost Volatility. A significant portion of operating expenses are displayed in local currency and relate to the price of aircraft and cruise fuel, which therefore exposes the business to fluctuations through the volatility of exchange rates and fuel prices. There is a risk that if the Group does not adequately manage the volatility of exchange rates, fuel prices and other input costs, this could result in increased costs and lower margins, affecting the ability to achieve certain goals. There is also the risk that if the hedging policy is too rigid, the Group may not be able to respond to competitive pricing pressures during the tourist season. Furthermore, changes in macroeconomic conditions may influence the exchange rates and the translation of market results into the reporting currency of the Group.

E. Seasonal Cash Flow Profile. Tourism is a seasonal business with the majority of profits earned in the summer months. There is a risk that if the Group does not adequately manage its cash balances in the winter season, this could affect liquidity and the ability to settle liabilities as they mature, while ensuring that financial conditions are met.

F. Legal & Regulatory Compliance. Most service providers operate across different countries and jurisdictions, which exposes them to a number of legal, tax and other regulatory laws that must be complied with. Operating across multiple source markets and in more than 115 destinations, the Group faces with a range of laws and regulations that must be complied with or else a risk of fines or other sanctions from regulatory bodies would emerge.

G. Health & Safety. For all service providers, ensuring the health and safety of customers is of paramount importance. This is especially true for the Group, as it is a globally operating tourism company, which annually sells leisure to more than 21 million customers. There is a risk of accidents or incidents that could result in illness, injury or death to customers or colleagues on a trip. This may result in reputational damage to the business and/or financial liabilities.

H. Supplier Reliance. Travel service providers are exposed to the risk of failure in their main suppliers, especially if the tourism services are integrated. This is aggravated by the industry convention on prepayments for hoteliers to ensure a secure distribution of rooms during the season as well as in areas where one supplier is used to provide a product or service. There is a risk that the Group will be unable to continue with its core business operations in the event of a major service failure from its key suppliers.

I. Joint Venture Partnerships. Travel and tourism groups normally use joint venture partnerships within their operations in order to reduce the risk of new ventures or to gain access to additional intellectual resources or innovations. The TUI Group consists of three large joint ventures: Riu, TUI Cruises and Sunwing. There is a risk that if the Group does not maintain effective relationships with its key partners or if their goals do not meet those of the Group, this could lead to operational difficulties and jeopardize the achievement of financial targets.

The results of risk assessment reveal that the Group may use risk diversification to ensure internal and external flexibility in conditions of global economic uncertainty. Technological solutions for global governance within the international tourism network are blockchain-based and enable synergy among the tourism market participants. Building interactions between participants in a regional ecosystem facilitates the innovative growth of the company in relation to its global and local dimensions. Recent studies show that synergistic effects of an innovation economy serve a unique hidden power, manifested only within open operations and in proactive cooperation. The efficiency of the regional innovation system is driven by many factors, from information security to transactional processes. The use of digital means helps reduce the human impact on the most communication processes, ensuring security and transparency of transactions. This is achievable through blockchain and smart contracts (Finogeev et al., 2018).

Blockchain technology has moved beyond the cryptocurrency and entrenched itself in various areas of international business (Hooper & Holtbrügge, 2020). It is predicted that by 2030, 30 percent of the global customer base will be constituted by entities using blockchain as a basic technology for conducting business activities [Gartner, 2017]. Going forward, the commercial use of blockchain will move from the experimental stage to presenting solutions to real problems, when large companies realize that it can be used to find solutions to current problems. This technology will provide many potential applications for cross-industry use that will impact contracts, transportation, payments and supply chain management (Floyd, 2018).

Blockchain is rapidly being adopted in financial institutions and banks, as well as in many other companies such as Samsung, Deloitte, RWE and IBM, with applications ranging from simplifying and automating trade finance to creating decentralized markets for electricity trading (Buterin, 2016). In addition, blockchain is used as a payment alternative to credit cards or PayPal for e-commerce and international transfers (Antonopoulos, 2017).

Blockchain is a kind of digital ledger or database that stores immutable records of all operations and transactions, all information about which is stored on the network (Drescher, 2017). Blockchain is a new type of database in which a distributed group of people can validate transactions and data in a way that does not require a centralized

third party and does not require them to trust each other. These data are stored in the blockchain and remain there publicly (Chirls, 2018).

Blockchain technology transforms traditional business activities by streamlining processes, increasing trust, and saving time and costs for companies (D. Tapscott & A. Tapscott, 2016). Automating processes and saving time with smart contracts make business more efficient and eliminate the need for bureaucratic procedures associated with organizing business processes (Torres de Oliveira, 2017). In addition, the risks associated with fraud and data security are reduced, since data no longer need to be transferred or managed by centralized organizations (Hooper & Holtbrügge, 2020).

The use of blockchain technologies affects the management of the international activities of companies on a global scale, changing traditional business processes and methods of cross-border transactions and allowing companies to operate in a decentralized mode (Hooper & Holtbrügge, 2020).

The blockchain technology has great potential to generate a fundamentally new mechanism for digital management. Research on blockchain applications in various fields revealed that the use of blockchain in international business is differential to global governance, enables the reduction of transaction costs and reliable protection of intellectual property rights (Hooper & Holtbrügge, 2020).

Blockchain technology provides significant benefits for the travel industry, as its implementation can help increase the competitive advantage of companies, increase customer satisfaction and productivity (Erceg et al., 2020). The use of blockchain technology in tourism can lead to lower costs associated with exchange rates and has great potential to simplify travel loyalty programs (Kowalewski et al., 2017).

Blockchain is multifaceted, and its application will improve tourism in several ways: (i) improve the travel experience by supporting the platform; (ii) cross-border payments through the blockchain are fast and reliable; (iii) the use of blockchain offers diversification, with which it protects the currency and strengthens the banking system; and (iv) blockchain can help reduce overall operating costs (Kwok & Koh, 2019).

In 2018, the TUI Group revealed a new revolution within its business development, embedding blockchain into its business model. The company tested blockchain by tracking internal operations with the aim of further expanding the scope of this technology to other processes. As per now, the company rolls out a pilot blockchain-powered project named BedSwap that allows recording hotel inventories (Kondratiuk, 2017).

The integration of global governance model with the TUI Group's partnership system (Figure 2) would make it possible to innovate and diversify tourism offerings through a cultural dimension of corporate management. The integration may generate a universal form of partnership based on corporate values and synergies as well as organizational and technological elements that are clearly defined.
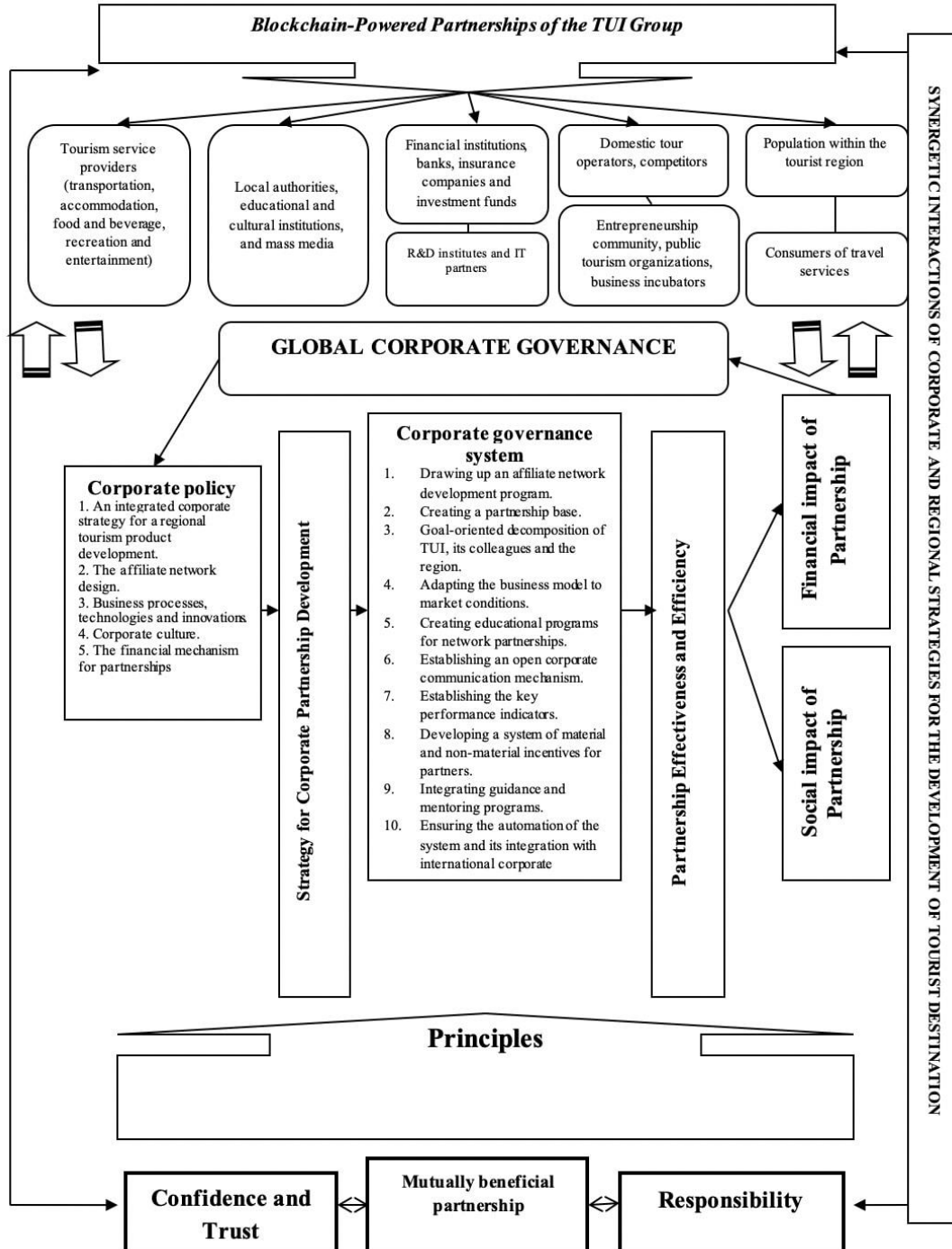
Figure 2. The TUI Group's Blockchain-Based Model of global governance.
Source: developed by the authors

As the information space and the loyalty systems of transport operators and hoteliers grow, tourism services became available to a broader range of consumers, entailing a mass refusal from the comprehensive travel services. A modern-day tourist adheres to democracy, independence and individualism in his journey-related decisions, which traditional service providers fail to ensure. In this regard, the tourism industry is undergoing significant changes of consumer demand towards new and creative. Thereby, the expansion into new markets and tourist destinations would provoke sustainability in transformation processes (Edgell, 2016). Meanwhile, various tour developers seek to portray the socio-cultural identity of tourist destinations.

The integration of global governance strategy into the corporate policy of the Group permits the sustainable tourism development, whilst shaping the international eco-friendly business model. The regional socio-economic effects of this strategy are shown in Figure 3.
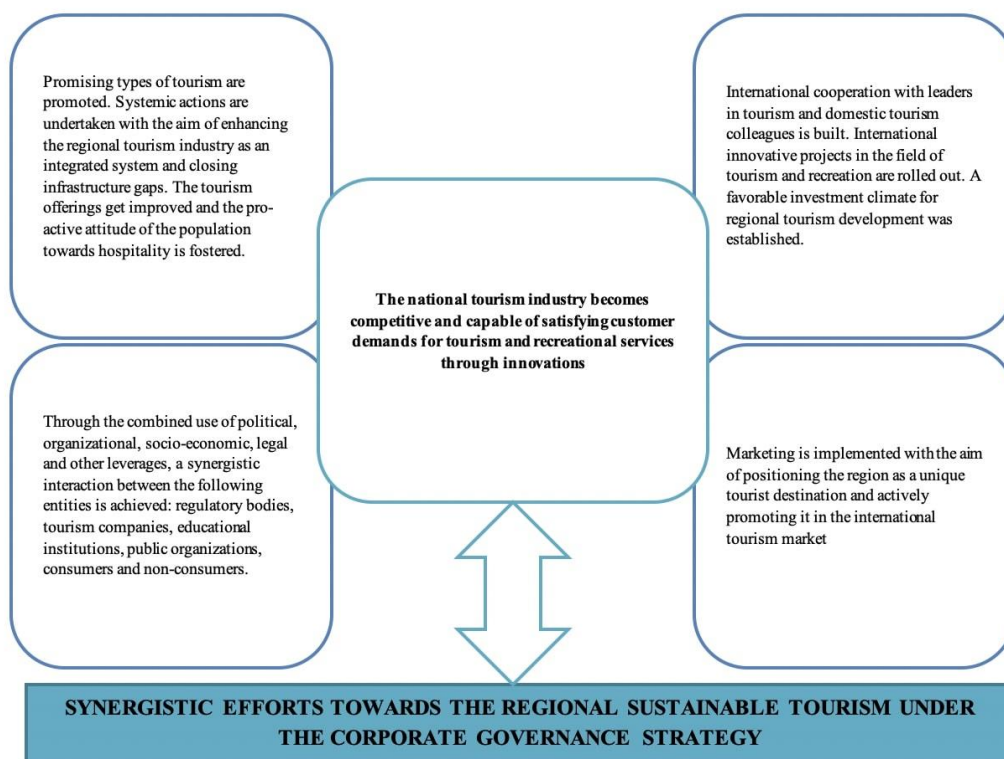
Figure 3. The socio-economic impact of employing the global governance strategy on the generation of competitive tourism products,
Source: developed by the authors

With globalization, the instability in business and project management has increased. Many internal and external factors influence the successful implementation of global projects of multinational companies. Organizational culture, socio-economic factors, inter-ethnic culture and senior management attitudes affect the work of a global project team (Bhullar, 2018). In international business, attention is mainly focused on the direct impact of international diversification on the profit or risk of firms, and little attention is paid to the impact of locations where internationalization activities have taken place (Harjito et al., 2018).

The success of the TUI Group largely depends on the success of global projects. Cross-border cultural diversification has a significant impact on the company's operations. In this regard, the company's interaction with regional representatives of the tourism market and the interweaving of development strategies allow improving the quality of the tourism product and providing the TUI Group with a competitive advantage in the global business scenario.

4. Discussion

The global instability and uncertainty necessitate a fundamentally new approach towards thinking and international interaction to manage public relations more efficiently, whilst reducing environmental footprint. Issues such as globalization and social policy management have been opened up for discussions in the last decade. The latter was regarded from the perspective of multicentricity where the concept of global governance went beyond intergovernmental institutions, was socially oriented and globally inclusive (Unlu, 2017). Meta-economic approaches to management in the context of globalization were determined with a focus laid on those frameworks for global governance that were aimed at sustainability, competitiveness, and innovation-driven economic growth (Buracas, 2018).

The concept of global governance was previously disclosed by the members of the Club of Rome with the aim of solving the global problems of social development and socio-economic relationship building. In 1968, the Club of Rome established a global forecasting, modeling and programming system. At the end of 2017, the Club members published a sensational report entitled 'Come on! Capitalism, Short-termism, Population and Destruction of the Planet.' This report proclaims that the Old World is doomed and a New World is inevitable (von Weizsacker & Wijkman, 2017). The new concept of global development calls for the rejection of materialism, financial speculation and capitalism. The report emphasizes the need for a philosophical approach towards the current world crisis. The authors refer to the initiative of the Pope and the UN approach articulated in the 2030 Agenda for Sustainable Development (United Nations, 2015).

Joining international tourism alliances and networks can enhance the innovative potential of tourism agencies through the expansion into new markets and the adoption of new technologies and value chains. However, the benefits from cooperation are intertwined with regulatory compliance that is crucial to competitiveness in the global tourism market. Studies revealed a negative impact of transnational tourism management, concluding a need for counteracting the negative influences of globalization (Mishulina, 2016). It is a justified recommendation to improve the mechanism for minimizing the negative environmental impact and associated socio-economic effects from large investment projects in the field of tourism and recreation (Molchanova, 2018).

The collaboration with single economies and global industries is a key to the acquisition of competitive advantages in the international arena. Global governance refers to the meaningful, process-oriented and polycentric actions and interactions between global actors having direct or indirect influence on international relations through the use of economic instruments, methods and mechanisms (Barry, 2001). Moreover, global governance goes beyond the boundaries of the national state and covers a network of diverse business-public interactions (General Assembly of the United Nations, 2010).

Conclusions

The rapid pace of transnationalization caused the international economic relations to transform. As a result, a range of new approaches to corporate governance in the global tourism sector have emerged that are based on the interdependence of national economies. The analysis of management and operational risks in the TUI Group strategy for global governance revealed that the Group may use risk diversification to ensure internal and external flexibility in conditions of global economic uncertainty. The risk likelihood assessment showed the need for the adoption of innovative management models to reduce the likelihood and impact of risks. The use of digital solutions will reduce the human impact on most communication processes, ensuring the security and transparency of transactions between economic agents.

The integration of blockchain-based global governance into the partnership system of the Group will make it possible to innovate and diversify tourism offerings through a cultural dimension of corporate management. The integration may generate a universal form of partnership based on corporate values and synergies as well as organizational and technological elements that are clearly defined. The expansion into new markets and tourist destinations was found to precondition sustainability within the Group's transformation processes. The analysis of socio-economic benefits from implementing the TUI Group's strategy for global governance to expand destination experience confirms the contribution to sustainable and eco-friendly international tourism.

References

Antonopoulos, A. (2017). *Mastering Bitcoin: Unlocking Digital Cryptocurrencies.* 2nd ed., London: O'Reilly

Barry, T. (2001). *Global Economic Governance: Strategic Crossroads. Foreign Policy in Focus*. Retrieved July 26, 2020 from https://fpif.org/global_economic_governance_strategic_crossroads/

Bhullar, P.S. (2018). Global Project Management – Challenges and Barriers. *Asian Journal of Management,* 9(1), 717-722. http://dx.doi.org/10.5958/2321-5763.2018.00111.7

Buracas, A. (2018). Metaeconomic Approaches in Global Governance. In A. Karasavvoglou, S. Goić, P. Polychronidou, & P. Delias (Eds.), *Economy, Finance and Business in Southeastern and Central Europe* (pp. 611–619). Cham: Springer.

Buterin, V. (2016). What is Ethereum?, Coincenter. Retrieved July 26, 2020 from https://coincenter.org/entry/what-is-ethereum

Chirls, N. (2018). *Blockchain & the Decentralization of Finance Featured Session at SXSW 2018, Video.* Retrieved July 26, 2020 from https://www.sxsw.com/interactive/2018/blockchain-and-the-decentralization-of-finance-featured-session-at-sxsw-2018/

Dangi, T.B., & Jamal, T. (2016). An Integrated Approach to "Sustainable Community-based Tourism". *Sustainability,* 8, 475–507. https://doi.org/10.3390/su8050475

Dovgal, G.V. (2014). The Evolution of Transnationalization in the Global Tourism Business. *Journal of V.N. Karazin Kharkiv National University,* 1144, 162–165.

Drescher, D. (2017). *Blockchain Basics: A Non-Technical Introduction in 25 Steps.* New York: Apress.

Duginets, G.V. (2017). Transnationalization of the World Tourism Market. *Market Infrastructure,* 9, 123–128.

Edgell, S. (2016). *Managing Sustainable Tourism: A Legacy for the Future.* London: Routledge.

Erceg, A., Sekuloska, J.D., & Kelić, I. (2020). Blockchain in the Tourism Industry—A Review of the Situation in Croatia and Macedonia. *Informatics*, 7, 5. https://doi.org/10.3390/informatics7010005

Finogeev, A.G., Gamidullaeva, L.A., Vasin, S.M., Finogeev, A.A., Pronichev, V.V., & Lychagin, K.A. (2018). Smart Contracts as a Tool for Safe Interaction of the Regional Innovation Subjects. *Social Sciences. Economics,* 3(47), 139–157.

Floyd, D. (2018). *Deloitte: 3 Out of 4 Big Companies See 'Compelling' Case for Blockchain.* Coindesk. Retrieved July 26, 2020 from https://www.coindesk.com/deloitte-3-out-of-4-big-companies-see-compelling-case-for-blockchain

Gartner (2017). Talari Networks. Blockchain WAN Edge = Leading the Digital Transformation. Gartner. Retrieved July 26, 2020 from https://www.gartner.com/imagesrv/media-products/pdf/Talari-Networks/talarinetworks-1-4A5JDFW.pdf

General Assembly of the United Nations. (2010). *Integrated and Coordinated Implementation of and Follow-up to the Outcomes of the Major United Nations Conferences and Summits in the Economic, Social and Related Fields*. Retrieved July 26, 2020 from http://www.un.org/en/ga/62/plenary/followupconf/bkg.shtml

Han, Y., Shao, X.F., Cui, X., Yue, X.G., Bwalya, K.J., & Manta, O. (2019). Assessing Investor Belief: An Analysis of Trading for Sustainable Growth of Stock Markets. *Sustainability*, 11(20), 5600. https://doi.org/10.3390/su11205600

Harjito, A., Bany-Ariffin, A.N., Matemilola, B., & Ashari, M. (2018). International Diversification and Multinational Firms' Risk: Do Locations of Investments Matter?. *International Journal of Economics & Management,* 12(1), 357-368.

Hooper, A., & Holtbrugge, D. (2020). Blockchain Technology in International Business. Changing the Agenda for Global Governance. *Review of International Business and Strategy.* https://dx.doi.org/10.1108/RIBS-06-2019-0078

Kondratiuk, A. (2017). The Europe's Largest Tour Operator Will Use Blockchain for Internal Operations. *Forklog*. Retrieved July 26, 2020 from https://forklog.com/krupnejshij-turoperator-evropy-zadejstvuet-blokchejn-dlya-vnutrennih-operatsij/

Kowalewski, D., McLaughlin, J., & Hill, A.J. (2017). *Blockchain Will Transform Customer Loyalty Programs.* Retrieved July 26, 2020 from https://hbr.org/2017/03/blockchain-will-transform-customer-loyalty-programs

Kwok, A.O., & Koh, S.G. (2019). Is blockchain technology a watershed for tourism development?. *Current Issues in Tourism,* 22(20), 2447-2452. https://doi.org/10.1080/13683500.2018.1513460

Mishulina, S.I. (2016). Mechanisms for Minimizing the Negative Environmental, Economic and Social Effects of Investment Projects. *Science Review,* 8, 170–177.

Molchanova, V.A. (2018). The Impact of Globalization on the Tourism Sector: Conceptual Approaches. *Russian Journal of Entrepreneurship,* 12, 3812–3826.

Shao, X.F., Gouliamos, K., Luo, B.N.F., Hamori, S., Satchell, S., Yue, X.G., & Qiu, J. (2020). Diversification and Desynchronicity: An Organizational Portfolio Perspective on Corporate Risk Reduction. *Risks,* 8(2), 51. https://doi.org/10.3390/risks8020051

Skarga, O.O. (2018). Areas for the Integration of Ukraine Into the World Tourism Market in the Context of Globalization. *Economic Domain,* 130, 36–49.

Sun, S., Li, T., Ma, H., Li, R.Y.M., Gouliamos, K., Zheng, J., Han, Y., Manta, O., Comite, U., Barros, T., Duarte, N., & Yue, X.G. (2020). Does employee quality affect corporate social responsibility? Evidence from China. *Sustainability,* 12(7), 2692. https://doi.org/10.3390/su12072692

Tapscott, D., & Tapscott, A. (2016). *Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business, and the World.* New York: Portfolio.

Torres de Oliveira, R. (2017). *Institutions, Middleman, and Blockchains.* Shuffle and Re-Start. Working Paper, University of Queensland – Business School. http://dx.doi.org/10.2139/ssrn.3027633

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Tui Group. (2019a). *Annual report Tui Group*. Retrieved July 26, 2020 from
http://annualreport2019.tuigroup.com/sites/default/files/downloads/tui_annual_report_2019.pdf

Tui Group. (2019b). *Combined Management report Tui Group*. Retrieved July 26, 2020 from
http://annualreport2019.tuigroup.com/sites/default/files/downloads/tui_ar_management_report_2019.pdf

Tui Group. (2019c). *Corporate Governance Tui Group.* Retrieved July 26, 2020 from
http://annualreport2019.tuigroup.com/sites/default/files/downloads/tui_ar_corporate_governance_2019.pdf

United Nations. (2015). *Transforming Our World: The 2030 Agenda for Sustainable Development*. Retrieved July 26, 2020 from
https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf

Unlu, A.D. (2017). *Global Governance Vs. Regional Governance in Social Policy. Handbook of Research on Technology Adoption, Social Policy, and Global Integration*. IGI Global. London: Routledge.

von Weizsacker, E.U., & Wijkman, A. (2017). *Come on!: Capitalism, Short-termism, Population and the Destruction of the Planet.* Cham: Springer.

Biographical note:

Asad H. ABURUMMAN is an Associate Professor at the University of Sharjah, UAE. Research interests: tourist guides; communication skills in tourism industry; heritage protection and its use for tourism purposes; tourist and guest behavior; laws and legislation in tourism; hospitality management; public relations in tourism; human resources management in tourism; knowledge management capabilities in tourism organizations; organizational behavior; quality management in tourism; creative ability of business; tourism and hotel marketing; tourism industry; hotel management; customer relationship management; hospitality technology.
ORCID ID: orcid.org/0000-0001-5495-5572

ENTREPRENEURSHIP AND SUSTAINABILITY CENTER

Publisher
http://jssidoi.org/esc/home

enterprise europe network
Business Support on Your Doorstep

OASPA

Scopus

Clarivate Analytics

OPEN INNOVATION MODEL IN THE KNOWLEDGE INTENSIVE BUSINESS SERVICES IN THE SLOVAK REPUBLIC[*]

Dana Benešová [1], Viera Kubičková [2], Miroslava Prváková [3]

[1,2,3] *University of Economics in Bratislava, Faculty of Commerce, Department of Services and Tourism, Dolnozemská cesta 1, Bratislava, Slovak Republic*

E-mails:[1] dana.benesova@euba.sk; [2] viera.kubickova@euba.sk; [3] miroslava.prvakova@euba.sk

Abstract. Innovation and its management has been a current challenge for companies in the knowledge economy. Open innovation is a system that creates and uses synergies from sharing and collaboration. The digital economy and society support the emergence and functioning of open innovation systems. In the Slovak Republic´s environment, the management of innovations through an open mechanism is a perspective for the development of knowledge intensive business services (KIBS). These services are an important link in the value chain of the Slovak economy focused primarily on the automotive industry. The article deals with the creation of a model of open innovation in the environment of KIBS production in the Slovak Republic. Its elements and their classification are based on the results of the primary survey carried out by the Delphi method. The importance of individual elements thus reflects the priorities of innovation management of KIBS companies in the Slovak Republic. In the current theory, we do not find a model with these specifications. The presented model thus represents an original result supported by the primary research in a specific environment. The construction of the model identifies three building components of the open innovation mechanism: preparation and planning, implementation, evaluation of outputs and a value creation. They are complemented by factors, risks and effects. The model provides the possibility of measurement at the level of inputs and outputs.

Keywords: open innovation; model; knowledge intensive businees services; the Slovak Republic

1.   Introduction

Innovations and its management have been a current issue for theory and practice. The reason is the effects of innovations, which, in the characteristics of the current economy, are a source of competitiveness of companies and national economies. The challenge for innovation management is therefore to set up a system that would support innovations, optimize the costs of their development and application, and generate synergistic effects. The Open Innovation Mechanism is a platform that accepts this challenge. At the same time, it reflects the conditions of the digital economy, within which the transfer of knowledge is accelerated and enables its sharing and cooperation of the subjects. According to Baur (2017), open innovation (OI) is nothing new, but it is currently gaining more acceptance and importance precisely because of digitalization. According to Trott and Hartmann (2009), the benefits and drivers of increased openness have been noted and discussed as early as the 1960s, especially in terms of mutual research and development (R&D) cooperation. The use of the term OI in relation to the growing trend of external cooperation was supported in particular by Chesbrough (2003), who expressed a modern view of open innovation and thus became the founder of this term. Several authors have been working on open innovation in the geographical territory of the V4 countries. Šmíd (2008) defines open innovation as a tool for sustainable business development. The authors Hvizdová and Máchal (2017), Knošková (2015), Vilčeková et al (2018) deal with the factors of knowledge transfer and cooperation of subjects in the mechanism of open innovation.

The topic of innovations in services and their management has a time lag in research compared to the same topic addressed in the conditions of production. This is also consistent with the thematic area of open innovation. According to Kubičková and Benešová (2011), the increased pressure on the performance of service producers is caused by increasing competition and growing trade in services. The need for service companies to make more efficient use of external ideas and technologies in their innovation activities is becoming increasingly desirable. The approach to open innovation according to Galati et al. (2012) may not be the same for all types of companies and in every industry. Each company is unique, with its own internal organization and specific internal dynamics and processes to which open innovation processes need to be adapted. This idea supports the effort to define open innovation and its mechanisms in the service production environment. The services sector is specific for its heterogeneity of activities. The production of services is affected by the specific characteristics of the services. It is therefore logical to accept differences in approaches to innovations and their management in services in terms of openness.

The article deals with the creation of a model of open innovation in the environment of knowledge-intensive production of services. The study presents a model of open innovation, which is constructed on the basis of the identification of factors, effects and risks of open innovation presented by several authors and models. Subsequently, it is adapted to the conditions of KIBS production in the Slovak Republic based on the application of the Delphi method. The method was applied by asking experts from the environment of innovation management in knowledge-intensive business services (KIBS) in the Slovak Republic. In current theory, we have not found a model with these specifications. The presented model thus represents an original result supported by the primary research in a specific environment.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

1. Literature review

According to Metcalfe and Miles (2017), in the age of digitalization, companies that have an active approach to knowledge acquisition and can use it effectively will be among the first to provide better, faster and cheaper solutions than their competitors. The period of the Fourth Industrial Revolution is characterized by complete automation and digitalization processes with the use of electronics and information technologies in both production and services. According to Roblek et al. (2016), companies that want to move forward and be successful in the current competitive struggle must adapt their innovation processes to the conditions of the Fourth Industrial Revolution.

Currently, collaboration is not just about sharing knowledge about technology, it is also about sharing knowledge of the market, customers, or companies´own business models. Open innovation can be a response to changing market conditions and more specific customer needs. Chesbrough (2003) defines OI as the acquisition and provision of knowledge to accelerate internal innovations while expanding markets for the external use of internal innovations. Conceptually, it is a more distributed, more cooperative and decentralized approach to innovations, based on the fact that today's useful knowledge is widely distributed and society does not make full use of its resources if it innovates itself. The author also presents the effects for which it is advantageous to involve OI processes: achieving sustainable profitability, stable growth, personalization of services, focus on new business models, growing agility of companies and profit from the aspects of the Fourth Industrial Revolution. Through the OI mechanism, a company can reduce costs, speed up time for product and services launches, increase market differentiation and create new revenue streams. In terms of OI effects, we can consider effects in the areas of: consumer and customer, employee, business performance, product, partners and technology.

According to the author Durmaz (2013), OI is about creating a system in which ideas from customers, employees and other interested parties are openly projected. This system makes it possible to collect and develop ideas in cooperation with other actors, leading to continuous innovations. The term OI defines Kirschbaum (2005) as a cooperation between companies, individuals and public agencies to create innovative products and services. This process is also about sharing your risks and rewards. The definition is based on the belief that in a world of distributed knowledge, companies can no longer rely solely on in-house research, but rather on the benefits of innovations in cooperation with partners. Open access to innovations has brought significant benefits in many areas, including healthcare, IT, business services and public policy.

From the point of view of the effort to incorporate open innovation into the type of innovation based on the definition of several authors, we can state that this is a mechanism for creating innovation, not a type of innovation. An OI mechanism can result in innovation of a different type or kind.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Table 1. Systematization of definitions of open innovation and identification of OI factors

Authors	Key elements of definition	Factors
Chesbrough (2003)	Knowledge transfer, cooperation	The degree of openness of the company's borders
Kearney (2008)	Cumulation of resources, partnership	Business model
Lazzarotti and Manzini (2009)	Cooperation	The level of cooperation
Tuomi (2009)	Sharing ideas	Availability and mobility of specialists
Dahlander and Gann (2010)	The process of exchanging and sharing innovations	Number and diversity of partners
Hilgers and Ihl (2010)	Knowledge transfer	Online environment
Wallin and Krogh (2010)	Creation and use of knowledge	Organizational structure of a company
Schweisfurth et al. (2011)	Integration of thoughts	Sharing culture
Galati et al. (2012)	Integration of innovative resources	Company culture
Lidegaard (2012)	Cooperation, shared use of innovative resources	Social openness
Piller (2012)	Integration of external knowledge	Technical openness
Durmaz (2013)	Cooperation	Interaction
Brant and Lohse (2014)	Integration of external knowledge	Motivation of individuals
Tidd (2014)	Resource sharing	Company motivation
Bengtsson et al. (2015)	Knowledge transfer	Transparency
Kirschbaum (2005)	Cooperation, risk sharing	Terms and conditions
Knošková (2015)	Cooperation	Protection of intellectual property
Oberhaus (2015)	Resource sharing	Business capacities
Dabic et al. (2016)	Cooperation and partnership	Sources of innovations
Greco et al. (2016)	Interaction	Knowledge management
Osorio et al. (2016)	Cooperation, interconnection of resources	Sources of knowledge and its availability
Hossain and Anees-ur-Rehman (2016)	Knowledge transfer	Management strategy
Zobel et al. (2016)	Transfer and exchange of knowledge	Innovation potential
Hvizdová and Máchal (2017)	Transfer and exchange of knowledge	Workforce qualification
Zapfl (2018)	Utilization of the innovative potential of the environment	Investments in R&D Creativity Cooperation

Source: author´s own, 2020

The above systematization of definitions of open innovation (Table 1) points to the application of different approaches and different understandings of this phenomenon. Chesbrough (2003) discusses knowledge flows, Tidd (2014), Dahlander and Gann (2010) identify open innovation as resources, which is a broader area. Others (Lazzarooti and Manzini, 2009) do not mention knowledge exchange in their definition, but instead they define it as a cooperation in which there are several partners doing something together. Cooperation is a common feature of explaining open innovation. The logical consequence of the cooperation is a grouping of partners, while the authors identify this group differently (Hossain, Anees-ur-Rehman, 2016; Wallin, Krogh, 2010; Greco et al., 2016; Tidd, 2014; Bengtsson et al., 2015; Chesbrough, 2003). The common element is the fact that the actors come from four areas: a company, individuals, private entities, public institutions. These are various departments in a company, employees, customers, clients, specialists, buyers, competitors, suppliers, universities, schools, research institutions, state and regional governing institutions, government, local communities, network and cluster partnerships, etc.

We understand open innovation as a process of sharing knowledge and other resources beyond the boundaries of the company/corporation as part of an open business model with a number of different actors with which the company/corporation cooperates. Open innovation is a mechanism enabling the use of synergistic effects from the sharing of innovation capacities of the participating actors, thus increasing the innovation potential of a company. Opening up the innovation process to partners has become a widely accepted path of innovations. In parallel with the growing research on open innovation, differences in the interpretation of the OI models have also developed. The basic point of differentiation is linked to the word "open," by which different scientists denote different degrees or dimensions of openness (Tynnhammar, 2017). According to Lazzarotti and Manzini (2009), the basic view of the application of OI in a company, which can be quantified, is an extent of openness to innovation. The extent of openness is a significant factor in the resulting effects of the mechanism of open innovation. According to the author Tynnhammar (2017) and his model, the extent is defined by the number of partners, the type of cooperation and cooperation in different parts of the process. More complex models focus on integrating and using ideas created outside and within a corporation in order to innovate. The defining feature of open innovation in this sense is the open business model.

The starting point for creating a model of open innovation in the environment of knowledge-intensive services in the Slovak Republic is the familiarity with the existing models and the determination of key elements for its construction with an emphasis on its functionality in a specific environment. A relatively extensive study of existing more or less complex efforts to model open innovation leads us to accept the following models of open innovation: the OI model focused on value creation (Aranha et al., 2015), the organizational model of OI (Salampasis, 2015), the model based on open innovation life cycle framework (Krause, Schutte, 2016), a model of the OI impact on a company's outputs (Farha, 2016). The models are not mutually exclusive, each author focuses on other aspects of an open innovation, as the purpose and focus of the model were partially different. The models differ mainly in the complexity of their application in practice, while the latter model integrates several already existing separate models into a common theoretical framework. An important finding is that the models have a built-in methodology for measuring open innovation and partly express the measurability of its effects. The question is the functionality of the models in terms of measurability of OI impacts, as they are, according to the several authors, too broad to be able to express them rigorously and quantitatively. The authors of the models express the possibility of measuring the effects of this mechanism only through the impacts on the overall performance of a company through key performance indicators.

The model focused on value creation and the one based on open innovation life cycle framework can be considered process-oriented, the other two as relationship-oriented. The models assume a partial ability to quantify and measure them, except for the conditions of the organizational model. Comparative analysis of the open innovation models is in table 2.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Table 2 Comparative analysis of the open innovation models

Title	Author	Characteristics	Measurability
The OI model focused on value creation	Aranha et al. (2015)	The functionality of open innovation is provided by an open business model that uses internal and external sources of knowledge and partnerships (independent variables) to create value (dependent variable). The process model.	✔
The organizational model of OI	Salampasis (2015)	Connectivity of three blocks: individual level, human resources management and organizational skills. An agile work environment is essential for the implementation of OI processes, which enables resiliency and flexibility of processes and also supports cooperation. The relational model.	**X**
The model based on OI life cycle framework	Krause and Schutte (2016)	The model consists of 18 factors and directs companies to implementation, performing and improving open innovations. The model consists of blocks: OI planning and preparation, OI application, OI measurement and evaluation, and OI enhancements. The process model.	✔
The model of OI impact on a company's outputs	Farha (2016)	The model measures the relationship between individual indicators and their impact on outputs in the form of inclination to innovation and company´s performance. It is based on 8 building blocks of open innovation: erosion factors, processes of open innovation, knowledge management, partnerships, organizational management, intellectual property, risks and benefits. These eight blocks are grouped into five indicators, which form a model of open innovation. The relational model.	✔

Source: author´s own

2. Methods

The aim of the article is to create a model of open innovation applicable in the environment of KIBS production in the Slovak Republic. The construction of the model was created on the basis of the acceptance of relevant model approaches and subsequently on the basis of the confrontation of the induced elements of the model with the professional environment. Using the chosen methodological procedure while constructing the model we answer the following research questions (RQ):

RQ1: What is the position of KIBS in the Slovak economy?

RQ2: Which factors of open innovation are the key ones in the conditions of KIBS in the Slovak Republic?

RQ3: Which risks are the most significant for the process of organizational innovation in KIBS in the Slovak Republic?

RQ4: What effects are created by the implementation of open innovation in KIBS in the Slovak Republic?

The starting information for the creation of the model is the position of KIBS in the Slovak economy as a relevant environment. Data from the Statistical Office of the Slovak Republic and Eurostat were used to identify the position of KIBS in the Slovak Republic. The selected indicators are gross domestic product, employment and labor productivity.

The construction of the model itself is based on the source analysis, existing OI models and the results of the Delphi method. By analyzing the relevant sources, we identified 81 key elements of OI. The key elements included the items: factor, risk, effect. After analysis of OI models, 125 key elements were identified. After combining the two above mentioned sources, a knowledge base with 206 key elements was created. This number represented a comprehensive range of identified factors, risks and effects, with the scale including term overlaps and content relatedness of the defined elements. Subsequently, we proceeded to narrow the scale on the principle

of term and content relatedness of concepts. The reduced database contained 52 key elements, which were divided into 3 logical units - building blocks of the OI model: the preparation and planning, the implementation, the evaluation of outputs and the value creation. Within the first block (planning and preparation for OI), based on the analysis of the sources, 4 main factors had been identified, which were further defined by means of subfactors. In the second block of OI (implementation of OI), the analysis of the sources had identified the process of open innovation, which can be applied in 3 ways, and then the main risks arising from these processes were identified. The third building block of OI (evaluation of outputs and value creation) was characterized by the effects resulting from the application of the OI mechanism for the company.

Through the application of the Delphi method, the degree of influence of factors, risks and effects on the application of the proposed conceptual model in the KIBS environment in the Slovak Republic was identified. The Delphi method was chosen for this qualitative survey by inquiring the experts. The conditions for the selection of the experts and the areas of their expertise were very specific, which significantly narrowed the circle of potential experts in Slovakia. 16 experts were contacted and 12 of them answered. The addressed experts (Table 4) worked for more than 3 years in an open innovation environment in KIBS.

The qualitative survey was conducted in the period of 7 - 20 January, 2020 in the form of an online questionnaire, created through Google forms. The questionnaire consisted of 19 questions, of which 3 were identification ones, 7 were open questions and 9 were closed. The closed questions consisted of the evaluation of the degree of influence of the selected factors, risks and effects in the form of the Likert scale (5 - the highest level of importance, 1 - the lowest level of importance) on the application of OI in KIBS in the Slovak Republic. Each evaluation was followed by an open question with the opportunity to express their views. Data processing was performed by calculating the average and median for the individual OI indicators. The average was used to determine the order of the factors, risks and effects. As stated by Egerová and Mužík (2010), if the average is equal to or lower than 3, then the given indicator is not important. If the average is higher than 3, the indicator is very important, and if its value is higher than 4, the indicator is the key one. The average was rounded to two decimal places. To identify the order of the subfactors, risks and effects, a scale of importance was assigned with the assigned significance (Table 3). The median was further used as an indicator of group opinion (Egerová and Mužík, 2010). After the evaluation, the resulting order as well as the median values were resent to the experts for verification and possible modification of the original answers. This verification took place in the period of 10 - 24 February, 2020 in the form of an online questionnaire created via Google forms. After obtaining feedback, the comments were incorporated and subsequently a draft conceptual model of the application of open innovation in the KIBS environment in the Slovak Republic was created, whose subfactors, risks and effects had a median value greater than or equal to 4 after the evaluation.

Table 3. Scale of the degree of influence of the factors (together with the sub-factors), risks and effects on the application of OI in KIBS

Scale of the degree of influence	Significance
1 – 2,4 (including)	insignificant
2,5 – 3,5(including)	less significant
3,6 – 4,4 (including)	significant
4,5 – 5 (including)	the key one

Source: the authors' own

Table 4 Information on the respondents - experts from the KIBS environment in the Slovak Republic

Position and department of the expert	Number of years of the expert´s experience	Number of employees in the relevant company	Activity of the company according to the categorization of economic activities SK NACE Rev. 2	Number of the experts-respondents
CPO (Chief People Officer),top management	7 and more	50- 100	Section J - 62.09 Other information technology and computer services	1
CEO (Chief Executive Officer),top management	3 - 5	50-100	Section J - 62.09 Other information technology and computer services	1
Senior manager, department of Customer-Specific Development	7 and more	101-150	Section J - 62.09 Other information technology and computer services	2
Senior manager, department of Cyber Security	3 - 5	101-150	Section J - 62.09 Other information technology and computer services	2
CEO (Chief Executive Officer), top management	5 - 7	up to 50	Section M - 70.22 Business and management consulting services	1
Senior manager, Department of Business Management	5 - 7	up to 50	Section M - 70.22 Business and management consulting services	2
Senior manager, Advisory Department	7 a viac	151-200	Section M - 69.2 Accounting, bookkeeping and auditing activities; tax consultancy	1
Senior manager, Human Resources Department	3 – 5	151-200	Section M - 69.2 Accounting, bookkeeping and auditing activities; tax consultancy	2

Source: the authors' own.

3. Results and discussion

RQ 1: What is the position of KIBS in the Slovak economy?
In the conditions of knowledge-based economy, the production of knowledge intensive services is a characteristic feature of advanced economies. KIBS are gaining a unique position, satisfying intermediate demand and thus directly influencing the promotion of innovation throughout the whole economy. One of the first definitions of the term KIBS is linked to Davis and Botkin, 1994. Their definition consisted of a common characteristic of companies with high level use of knowledge. In the economic activities, KIBS are represented by sections J - information and communication services, M - professional, scientific and technical activities (excluding division M 75) and divisions N 78 - job placement, N 80 - security and investigation services. According to Nählinder (2005), KIBS are services and business operations that are highly dependent on expertise. As a result, their employment structures are shaped for the benefit of scientists, engineers and other professionals. Their

importance in the Slovak economy is supported by a strong customer base of the automotive, electrical and engineering industries, whose competitiveness is also conditioned by quality service deliveries.

In 2018, KIBS accounted for 13.3% of total GDP in the Slovak Republic, and information and communication services accounted for 4.2% of GDP. They accounted for 13.4% of total employment and information and communication services for 2.9% (Statistical Office of the Slovak Republic, 2020). According to the statistical availability, GDP and employment in KIBS include the performances of sections J, M and N. In the period of 2008-2017, the volume of GDP in the Slovak Republic, created in sections J and M together, increased, while in 2007 it amounted to 5211.5 mil. EUR and in 2017 7933.0 mil. EUR. The decrease in this indicator was recorded only in 2013. This volume was the lowest among the V4 countries, but the growth rate was higher in the Slovak Republic than in Czechia and Hungary. The average annual GDP growth rate in KIBS in the Slovak Republic was 4.8% in the period under review (European Commission, 2020). The dynamics of the development of KIBS in the Slovak Republic suggests their relatively significant impact on the Slovak economy. At the same time, their influence is also strengthened by the ability of KIBS products to transform innovations into buyer entities and to improve value chains in the Slovak economy.
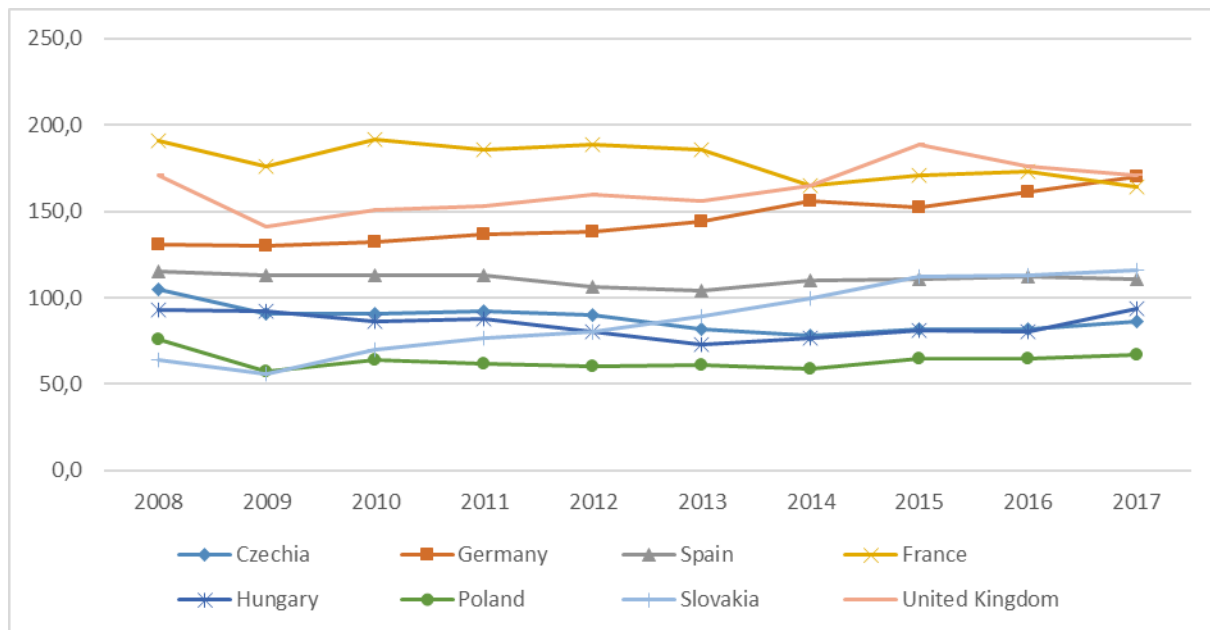
Fig. 1. Labour productivity in KIBS (thousands of EUR)

Source: author´s own based on the Eurostat database

A comparison of the achieved labor productivity in KIBS (expressed as sales per employee) and its development in the years of 2008 - 2017 in the selected countries suggests that KIBS productivity in the Slovak Republic increased and it is the highest in the V4 countries at the end of the period under review, reaching the labor productivity level achieved in Spain (Fig. 1). Support for increasing performance in KIBS in the Slovak Republic is a challenge for the area of innovations and their management. Therefore, we chose the KIBS production environment as a relevant environment for creating an open innovation.

RQ 2: Which factors of open innovation are the key ones in the conditions of KIBS in the Slovak Republic?

Based on the analysis of the sources on the subject, we defined four key factors - company culture, organizational structure, business model and organizational readiness, as those influencing the implementation and the process of open innovation (OI) in companies mostly.

We relied on the several authors (Chesbrough 2003; Tuomi 2009; Wallin and Krogh 2010; Galati et al. 2012; Zobel et al. 2016; Hvizdová and Máchal 2017; Zapfl 2018), who identified company culture as an important factor creating a satisfactory or unsatisfactory background for the application of OI. However, when implementing open innovation processes, it is important that the company culture, when communicated by it externally, reflects the real situation within the organization. By testing through the subfactors creating the company culture of the KIBS companies in the Slovak Republic (Table 5), we found that the key subfactors with the highest impact on the use of open innovation are: motivation, cooperation, freedom of expression, leadership style, dialogues and employee training within the organization. Very important subfactors are also respect for diversity, acquisition and retention of talents, mutual internal dynamics, creativity, organizational support and trust.

Table 5 The influence of the key factors of open innovation in the KIBS conditions in the Slovak Republic

Evaluation of the influence of the company culture factor on open innovation through the subfactors							
Subfactor	Motivation	Cooperation	Freedom of expression	Leadership style	Dialogues	Education	Respect for diversity	Acquisition and retention of talents
Mean	5	4,75	4,75	4,5	4,25	4,25	4	4
Median	5	5	5	4,5	4,5	4,5	4	4
Subfactor	Internal dynamics	Collectivity	Creativity	Organisational support	Trust	Fair play	Development	Intellectual potential
Mean	3,75	3,5	3,75	3,75	3,75	3,25	3,25	3
Median	4	3,5	4	4	4	3	3	3
Evaluation of the impact of the organizational structure factor on open innovation through the subfactors							
Subfactor	Top management	Human resources management	Research and development	Knowledge management	Intellectual property management	Sales department	Marketing department	Financial department
Mean	5	4,5	3,75	3	2,5	2,25	2	1,75
Median	5	4,5	4	3	2,5	2	2	2
Evaluation of the impact of the business model factor on open innovation through the subfactors							
Subfactor	Open innovation environment of the company	Intensive cooperation in the company	Mixed financial resources	Interactions in the ecosystem	Open process of innovation development	Creating an open innovation community	Creating an open innovation ecosystem	Large number and diversity of partners
Mean	4,25	4,25	4,25	4	4	3,5	3,5	3
Median	4,5	4,5	4,5	4	4	3	3	3
Evaluation of the impact of the factor of organizational readiness of the company on open innovation through the subfactors							
Subfactor	Strategic orientation	Qualified workforce	Open innovation processes	Findings on open innovation	Internet and online environment			
Mean	4,75	4,5	4,25	3,75	3,25			
Median	5	4,5	4,5	4	3			

Source: authors' own processing of survey results, 2020

The open innovation factor "organizational structure" is the way in which a company communicates, shares responsibilities and adapts to change. According to several authors (Kearney, 2008; Schweisfurth et al. 2011; Piller, 2012; Durmaz, 2013; Hvizdová and Máchal, 2017), the division of powers and responsibilities within a company has an impact on the overall application of open innovation processes and thus on the company's relationship with the external environment. . The key subfactors reflecting the „organizational structure" factor in KIBS companies in the Slovak Republic are top management and human resources, which the company has at its disposal and manages. The top management of the company makes decisions of a strategic nature that affect the degree of implementation of OI, human resource management plays an important role in managing the optimal exchange of knowledge from employees to the management of the company and vice versa. A very important subfactor is also research and development carried out within the company as well as in cooperation with external partners.

Based on many authors (Chesbrough, 2003; Durmaz, 2013; Brant and Lohse, 2014; Knošková 2015; Dabic et al., 2016; Greco et al., 2016; Osorio et al., 2016; Zapfl 2018 and others) an important factor of OI is the business model focused on openness in the application of innovation processes.

Openness within the business model means in particular the ability of the company to open up when exchanging knowledge and other resources (human, financial, material and others). Openness also applies to a large extent to cooperation, which must be effective both within the company and beyond its borders, implemented interactively in the innovation ecosystem. Millard (2018) defines an innovation ecosystem as a complex of communities, organisms and its subsistence environment functioning as an ecological unit. The innovation ecosystem consists of actors such as universities, governments, corporations, businesses, private investors, foundations and others. Each of them plays an important role in creating the value chain of the ecosystem by turning new ideas into reality through cooperation, the provision of open accesses or financial investments. The results of the survey show that the key subfactors of the business model in KIBS companies in the Slovak Republic are an open innovative business environment, intensive cooperation in the company and interactions in the ecosystem. Very important sub-factors include the use of mixed financial resources and the open process of innovation development.

According to numerous authors, a significant factor in the application of OI is the organizational readiness of the company. Open innovation is not a one-off tool, given that the effects of the application of OI have a long-term effect, it is therefore heterogeneous in time and a strategic tool. Open innovation is based on the high qualification of human resources, but also on human abilities to cooperate, accept external sources of knowledge, or offer their knowledge for external use. The results of the survey indicate that the key subfactors of the organizational readiness of KIBS companies in the Slovak Republic are the strategic orientation towards innovation openness, a qualified workforce and the processes of development of open innovation processes. A very important subfactor is also the knowledge about OI, which company management and employees have at their disposal, permanently share and further develop.

RQ 3: Which risks are the most significant for the process of organizational innovation in KIBS in the Slovak Republic?
Based on the findings of several authors, for example, according to West and Bogers (2017), Chesbrough, Euchner (2011), there are two types of OI processes: inside-out and outside-in. The authors Dahlander and Gann (2010) add a third, coupled process, to the two existing processes. The types vary depending on the flow of knowledge, with the coupled process linking these flows. The type of OI affects the mechanism of OI, its results but also the risks.

Table 6. The evaluation of the importance of the risks of open innovation in the conditions of KIBS in the Slovak Republic

The evaluation of the importance of the risks of open innovation						
Risks	Limited ability to develop and use intercompany relations	Limited ability to use external knowledge	Knowledge flow management	Increasing the complexity of processes resulting from cooperation with external parties	Development limitation of the internal skills and key technological competencies	Increase of the dependence on external technology providers	Limited ability to provide internal knowledge for external needs
Mean	4,25	4	4	3,5	3,25	3	2,75
Median	4	4	4	3,5	3,5	3	3

Source: authors' own processing of survey results, 2020

Not all risks arising from the application of OI can be accurately predicted, but it is generally possible to identify the most frequent risks. By testing the risks in the survey, we specified the most important and critical risks of the application of OI in KIBS companies in the Slovak Republic (Table 6), which are limited ability to develop and use intercompany relations, limited ability to use external knowledge and limited ability to manage knowledge flow. The ability of management and employees to share new knowledge or resources, cooperate with external partners, apply knowledge management in the business processes are the basic principles of open innovation, the absence of which threatens the success of OI implementation. The identification of the status of business processes and the preparatory phase of the application of OI is therefore crucial for the companies.

RQ4: What effects are created by the implementation of open innovation in KIBS in the Slovak Republic?
With the open innovation processes, many positive effects are created, it is necessary to define the goal that the company wants to achieve by applying OI. Based on this, the company can use the decision-making process to determine the scope of the project, the number and nature of the partners, the purpose of using open innovation, the risks of open innovation and others. It will answer the question of whether the implementation of open innovation is the best tool to achieve the goal, to gain competitive advantage and what other effects it can bring to the company.

Table 7. The evaluation of the importance of the effects of open innovation in the conditions of KIBS in the Slovak Republic

The evaluation of the importance of the effects of open innovation							
Effects	Competitive advantage	New revenue streams	New products and services	Improving customer relationships	Cost reduction	Strengthening relations with employees	Improving financial performance	Improving management skills
Mean	5	5	5	4	4	3,75	3,75	3,5
Median	5	5	5	4	4	4	4	3,5

Source: authors' own processing of survey results, 2020

The results of the survey indicate the key effects of open innovation in the conditions of KIBS in the Slovak Republic (Table 7), which are gaining a competitive advantage, generating the new revenues and creation of new products and services. Respondents consider the improvement of relations with customers, employees and partners, the reduction of production costs and the improvement of the company's financial performance to be very important effects.

Discussion

The OI model in KIBS in the Slovak Republic (Fig. 2) was compiled primarily from internal factors of open innovation and is focused on the business processes. The basis of the model is based on the Model based on OI life cycle framework (Krause and Schutte, 2016) and the Organizational Model of OI (Salampasis, 2015), as the application of open innovation itself depends, according to the several authors, mainly on the organizational structure of a company and its culture, which is based on the principle of cooperation.

According to the several authors, the open business model is a basic factor that should be part of all OI models. Within the last, third building block in the model, the basic factors were identified mainly from the Model of OI impact on a company's outputs (Farha, 2016) and supplemented by knowledge from the OI model focused on value creation (Aranha el al., 2015).

The model design therefore consists of the several previous models. Figure 1 graphically expresses the design of the Model of OI application in KIBS in the Slovak Republic.

The model consists of 3 building blocks, the first (planning and preparation for OI) is further divided into the factors: organizational readiness, company culture, organizational structure and open business model. These factors are supplemented by other subfactors that characterize them in more detail.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
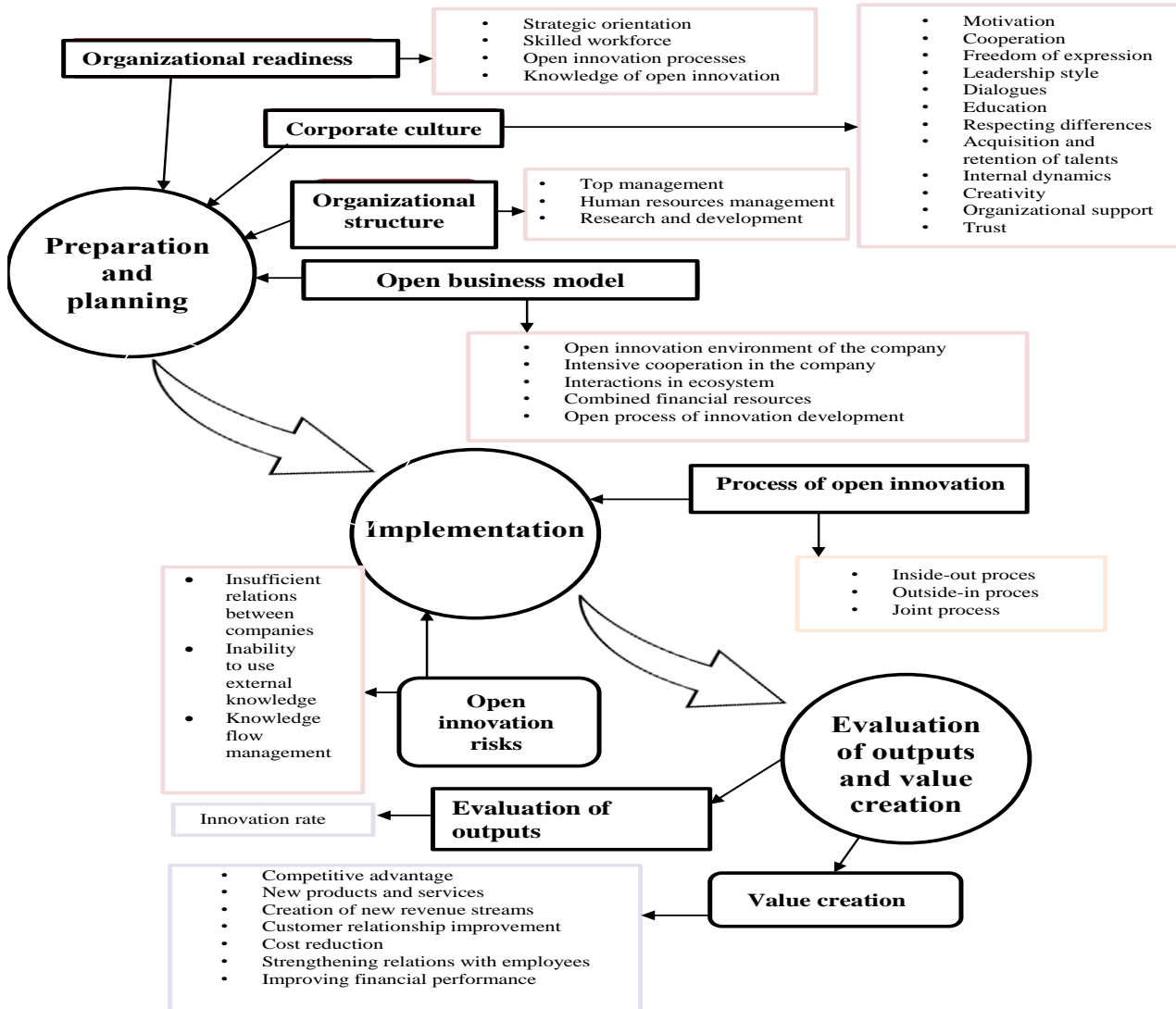
Fig. 2. The model of open innovation in KIBS in the Slovak Republic

Source: authors' own, 2020

The second building block (implementation of OI) is divided into the OI processes and the risks arising from these processes. The last, third building block of the model is divided into evaluation of outputs and value creation. This model makes it possible to express the innovative potential of the mechanism. This is expressed by the inputs to the open innovation mechanism through the evaluation and/or quantification of the proposed sub-factors listed under the "preparation and planning" building block. The effective use of the inputs of the open innovation mechanism is influenced by the way it is implemented, while the correct choice of a specific method affects the risks of OI. The model allows to measure the effects from the implementation of OI in KIBS. The

priority output of the OI system is the innovativeness of the subject expressed in the model by the level of innovation. Other measurable effects are aimed at creating value for the KIBS entity applying OI.

Value creation for a company is reflected in the sphere of its market position, product competitiveness, financial income and financial performance, customer relations, cost reduction and employee relations.

Conclusion

The position of KIBS in the Slovak economy can be described as significant not only with regard to the achieved economic performance and their dynamics, but also due to their function of transferring innovations to the value chains of production of the key sectors of the Slovak economy. The requirement of quality, availability and innovation of KIBS products in the Slovak Republic is an important condition for satisfying the intermediate demand of industrial companies in the Slovak Republic. Support for increasing the quality and performance of KIBS in the Slovak Republic is a challenge for the area of innovations and their management. The solution to the issue of open innovation systems is therefore very topical for the KIBS production environment in the Slovak Republic. We understand open innovation as a process of sharing knowledge and other resources beyond the boundaries of the company/corporation as part of an open business model with a number of different actors with which the company/ corporation cooperates. Open innovation is a mechanism enabling the use of synergistic effects from the sharing of innovation capacities of the participating actors, thus increasing the innovation potential of the company.

The study presents a model of open innovation, which is constructed on the basis of the identification of the factors, effects and risks of open innovation presented by the several authors and models. Subsequently, it is adapted to the conditions of KIBS production in the Slovak Republic based on the application of the Delphi method. The method was applied by asking experts from the environment of innovation management in knowledge-intensive business services (KIBS) in the Slovak Republic. The mentioned model is thus a functional tool for evaluating the innovation potential of a company operating in a relevant environment and a tool for evaluating the outputs of the OI mechanism applied in a given company.

The application of the presented OI model allows to achieve positive effects for the company producing KIBS. It is also important to realize that the impacts of the OI mechanism effects in KIBS will be notable for the relevant business environment. These are the schools, universities, businesses, public institutions and research institutions that enter into the processes of sharing not only the resources but also the effects as part of the functioning of the open innovation mechanism with KIBS company. This creates synergistic effects that can be identified not only in the KIBS environment, but also in other economic and social areas. The application of the model may be limited by the capital background of the company and its origin. Companies with multinational operations are subject to the management practices created by the parent company. These practices can accept other key elements of the open innovation mechanism that are functional in the environment of the parent company's economic and social conditions. Thus, the application of the proposed model within multinational corporations may not be accepted.

The specific application of the key elements of the OI KIBS model in the Slovak Republic is further dependent on the selection of indicators enabling accurate quantification of inputs (subfactors) and outputs (effects). This process is unique to a specific company/corporation. Further applied research in this area should be aimed at identifying specific indicators for a defined entity. At the same time, it is important to deal with the identification of barriers and critical points before applying the model in the specific conditions of the selected entity. The success of the application of the OI model in KIBS in the Slovak Republic may be influenced by the company's

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

innovation capacity, strategic priorities, company culture, organizational readiness, cooperation ability, innovative maturity, expectations, management style, level of ICT use, communication skills and financial resources.

References

ARANHA, A., GARCIA, N.A.P., CORRÊA, G. (2015). Open Innovation and Business Model: A Brazilian Company Case Study. Journal of Technology Management & Innovation, 10(4) http://dx.doi.org/10.4067/S0718-27242015000400010

BAUR, P. (2017). The Advance of Open Innovation. https://news.sap.com/2017/04/henry-chesbrough-interview-advance-of-open-innovation/

BENSTSSON, B., LAZZAROTTI, V., LAKEMOND, N., MANZINI, R. (2015). Open to a Select Few? Matching Partners and Knowledge Content for Open Innovation Performance. Creativity and Innovation Management. 24(1), http://dx.doi.org/10.1111/caim.12098

BRANT, J. LOHSE, S. (2014). The Open Innovation Model. Paris. International Chamber of Commerce. 28 p. https://www.iccwbo.be/wp-content/uploads/2012/03/20140325-The-Open-Innovation-Model.pdf

DABIC, M., BASIC, M., VLAJČIĆ, D. (2016). Introduction to the Open Innovation Paradigm. LUT Scientific and Expertise Publications. 113-162. https://www.researchgate.net/publication/316526811_Introduction_to_the_Open_Innovation_Paradigm

DAHALANDER, L. GANN, D. M. (2010). How open is innovation? Research Policy, 39(6), 699-709. http://dx.doi.org/10.1016/j.respol.2010.01.013

DAVIS, S. BOTKIN, J. (1994). The Coming of Knowledge-Based Business. Harvard Business Review, (9-10), https://hbr.org/1994/09/the-coming-of-knowledge-based-business

DURMAZ, L. (2013). Open Innovation – Definition and Benefits. http://imblog.ideaglow.com/open-innovation-definition-benefits/

EGEROVÁ, D., MUŽÍK, J. (2010). Aplikace metody Delphi při expertním stanovení faktorů ovlivňujících efektivnost e-learningu ve vzdělávání pracovníků v malých a středních podnicích (Application of the Delphi method in the expert determination of factors influencing the effectiveness of e-learning in the education of employees in small and medium-sized enterprises). E+M Economics & Mmanagement, 10(2), 137-152, www.ekonomie-management.cz/download/1331826760_1072/13_egerova.pdf

EUROPEAN COMMISSION. (2020). Eurostat database. Available 2020-04-28 at https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do

FARHA, S. (2016). Open Innovation Practices in the Professional Services Industry. Université de Montréal, p. 471. https://publications.polymtl.ca/2458/1/2016_ShadiFarha.pdf

GALATI, G., BIGLIARDI, B., DORMIO, A.I. (2012). The adoption of open innovation within the telecommunication industry. European Journal of Innovation Management, 15(1), 27-54. http://dx.doi.org/10.1108/14601061211192825

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

GRECO, G., GRIMALDI, M., CRICELLI, L. (2016). An analysis of the open innovation effect on firm performance. European Management Journal, 34(5), 501-516. http://dx.doi.org/10.1016/j.emj.2016.02.008

HILGERS, D. IHL, CH. (2010). Citizensourcing: Applying the Concept of Open Innovation to the Public Sector. International Journal of Public Participation, 4(1), 67-88, https://pdfs.semanticscholar.org/027e/28e33c592adc746c5ba4b77e8ca14fc1cd75.pdf

HOSSAIN, M. ANEES-UR-REHMAN, M. (2016). Open innovation: an analysis of twelve years of research. Strategic Outsourcing An International Journal, 9(1), 22-37. http://dx.doi.org/10.1108/SO-09-2015-0022

HVIZDOVÁ, E. MÁCHAL, P. (2017). Vplyv manažmentu ľudských zdrojov na otvorené podnikové inovácie – perspektíva projektového manažmentu (The impact of human resource management on open business innovation - the perspective of project management). Ekonomika Management Inovace, 9 (3), 39-48. http://emijournal.cz/wp-content/uploads/2017/12/04_vplyv-manažmentu-ludských-zdrojov.pdf

CHESBROUGH, H. (2003). The Logic of Open Innovation: Managing Intellectual Property. California Management Review, 45(3), 33-58, https://doi.org/10.1177/000812560304500301

CHESBROUGH, H., EUCHNER, J. (2011). The Evolution of Open Innovation: An Interview with Henry Chesbrough, Research-Technology Management, 54:5, 13-18. http://dx.doi.org/10.5437/08956308X5405003

KEANREY, A. T. (2008). What are the innovation management tools. Available 2019-07-01 at https://www.researchgate.net/profile/Faris_Alshubiri/post/What_are_the_innovation_management_tools/attachment/59d6265b79197b8077984a75/AS%3A321868731486208%401453750893367/download/6.pdf

Kirschbaum, R. (2005). Open Innovation In Practice, Research-Technology Management, 48(4), 24-28. http://dx.doi.org/10.1080/08956308.2005.11657321

KNOŠKOVÁ, Ľ. (2015). Riadenie inovačných procesov (Management of innovation processes). 1. vyd. Bratislava: Vydavateľstvo EKONÓM, 2015. p.123.

KRAUSE, W. SCHUTTE, C. (2016). Developing design propositions for an open innovation approach for SMEs. South African Journal of Industrial Engineering, 27(3), http://dx.doi.org/10.7166/27-3-1625

KUBIČKOVÁ, V. – BENEŠOVÁ, D. (2011). Character and innovation activity intensity in services in the Slovak Republic and its economic importance. Journal of Economics, 59(4), 412–427, https://www.sav.sk/index.php?lang=en&doc=journal-list&part=article_response_page&journal_article_no=6704

LAZZAROTTI, V. – MANZINI, R. (2009). Different Models of OI: A Theoretical Framework and An Empirical Study. International Journal of Innovation Management, 13(4), 615-636, https://doi.org/10.1142/S1363919609002443

LIDEGAARDA, S. (2012). Social Media for Corporate Innovators & Entrepreneurs: Add Power to Your Innovation Efforts. Available 2019-07-02 at http://www.tinno.com.br/wp-content/uploads/2013/01/Social-Media-for-Corporate-Innovators-and-Entrepreneurs.pdf

METCALFE, J. S. MILES, I. (2000). Innovation Systems in the Service Economy: Measurement and Case Study Analysis. 1. edition New York: Springer Science+Business Media New York, p. 339.

MILLARD, J. (2018). Open governance systems: Doing more with more. Government Information Quarterly, 35(4), 577-587. https://doi.org/10.1016/j.giq.2015.08.003

NÄHLINDER, J. (2005). Innovation and Employment in Services: The case of Knowledge Intensive Business Services in Sweden. Dissertation Thesis, Linköping University. http://liu.diva-portal.org/smash/get/diva2:20573/

OBERHAUS, D. (2015). Open Innovation Definiton. https://www.innoget.com/open-innovation-definition

OSORIO, A.E., OZKAZANC-PAN, B., JIANG, C., JAVADIAN, G., GUO, G., DUTTA, D.K., GUPTA, V.K. (2016). Classics in entrepreneurship research: Enduring insights, future promises. New England Journal of Entrepreneurship, 19(1), 7-23. https://doi.org/10.1108/NEJE-19-01-2016-B001

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

PILLER, F. (2012). Global solutions, local failure - overcoming barriers implementing open innovation. https://www.mixprize.org/hack/global-solutions-local-failure-overcoming-barriers-implementing-open-innovation/

ROBLEK, V., MEŠKO, M., KRAPEŽ, A. (2016). A Complex View of Industry 4.0. SAGE open, 6(2), https://doi.org/10.1177/2158244016653987

SALAMPASIS, D., (2015). Trust Embedded Open Innovation: Human-Centricity in the Financial Industry. Dissertation Thesis, Lappeenranta University of Technology, https://lutpub.lut.fi/bitstream/handle/10024/117308/Salampasis%20A4.pdf?sequence=2

SCHWEISFURTH, S., RAASCH, K., HERSTATT, C. (2011). Free revealing in open innovation: A comparison of different models and their benefits for companies. International Journal of Product Development, 13(2), 95–118. https://doi.org/10.1504/IJPD.2011.038867

ŠMÍD, J. (2008). Otvorené inovácia. http://www.nanosvet.sk/_paper/otvorena_inovacia.pdf

ŠTATISTICKÝ ÚRAD SLOVENSKEJ REPUBLIKY (2020). Verejná databáza údajov STATdat (.
Public database STATdat) http://statdat.statistics.sk/cognosext/cgi-bin/cognos.cgi?b_action=xts.run&m=portal/cc.xts&gohome=

TIDD, J. (2014). Open Innovation Management Research and Practice. Imperial College Press: London, UK, https://www.researchgate.net/publication/285734571_Open_Innovation_Management_Research_and_Practice

TROTT, P. HARTMANN, D. (2009). Why Open Innovation is Old Wine in New Bottles. International Journal of Innovation Management, 13(4), 715–736, http://enterrasolutions.com/media/docs/2013/02/1.pdf

TUOMI, I. 2009. Theories of Open Innovation.
http://www.meaningprocessing.com/personalPages/tuomi/articles/TheoriesOfOpenInnovation.pdf

TYNNHAMMAR, M. (2017). Open Innovationandits definitions. XXVIII ISPIM Innovation Conference. In Proceedings of the Innovation Symphony, Vienna, Austria, 18–21 June 2017. https://www.diva-portal.org/smash/get/diva2:1133607/FULLTEXT01.pdf

VILČEKOVÁ, L., MUCHA, B., PERÁČEK, T., STRÁŽOVSKÁ, Ľ. (2018). *Selected issues of family business in selected countries with emphasis on the Slovak Republic.* Proceedings of the 31st International Business Information Management Association Conference, IBIMA 2018: Innovation Management and Education Excellence through Vision 2020, 2500-2509

WALLIN, W.M. KROGH, V.G. (2010). Organizing for Open Innovation: Focus on the Integration of Knowledge. Organizational Dynamics, 39(2), 145–154, https://doi.org/10.1016/j.orgdyn.2010.01.010

West, J., Bogers, M. (2017) Open innovation: current status and research opportunities, Innovation, 19(1), 43-50. https://doi.org/10.1080/14479338.2016.1258995

ZAPFL, D. (2018). Open Innovation vs. Closed Innovation. Available 2019-07-16 at https://www.lead-innovation.com/english-blog/open-innovation-vs.-closed-innovation

ZOBEL, A. et al. (2016). The open innovation research landscape: established perspectives and emerging themes across different levels of analysis. Industry and Innovation, 24(1), 8-40, https://doi.org/10.1080/13662716.2016.1240068

Dana BENEŠOVÁ
ORCHID ID: https://orcid.org/0000-0002-9336-7447

Viera KUBIČKOVA
ORCHID ID: https://orcid.org/0000-0001-6129-2471

Miroslava PRVÁKOVÁ
ORCHID ID: https://orcid.org/0000-0002-5214-8395

METHODOLOGY APPROACH ON BENCHMARKING REGIONAL INNOVATION ON SMART SPECIALISATION (RIS3): A JOINT MACRO-REGIONAL TOOL TO REGIONAL PERFORMANCE EVALUATION AND MONITORING IN CENTRAL EUROPE[*]

Laima Gerlitz [1], Christopher Meyer [2], Gunnar Prause [3]

[1,2,3] *University of Applied Sciences Wismar: Technology, Business and Design*
Philipp-Müller-Str. 14, 23966 Wismar, Germany
[2,3]*Tallinn University of Technology*
Ehitajate tee 5, 19086 Tallinn, Estonia

E-mails: [1] laima.gerlitz@hs-wismar.de; christopher.meyer@hs-wismar.de; [3]gunnar.prause@hs-wismar.de

Abstract. The current funding period of the European Union 2014 – 2020 advocates the application of the Smart Specialisation approach that has to be implemented on regional level. European NUTS-2 regions shall evaluate and reconsider their regional strategies for the upcoming funding period. Due to the high differences among the regions in terms of existing monitoring systems and policies, the performance measurement lacks a solid basis for a sufficient comparison, exemplification and transfer. In order to reduce this research gap, within this paper, the authors developed a comprehensible methodological tool using a given number of NUTS-2 regions with their distinctive monitoring systems and indicators in Central Europe. The benchmarking process is focusing on deploying existing performance indicators

from each regional strategy, analysing them and aiming at developing one common set of indicators. As a result, the developed methodology approach enables sufficient performance comparison in terms of RIS3 implementation in the current funding period on the one hand, and provides a crucial input for the future monitoring system design. As a result, the novel methodological tool yields contribution to both scholarly literature and practitioners. Furthermore, the benchmarking method provides various selection and combination options that allow direct insights in different fields' performance, such as regional spending to facilitate RIS3 implementation and Entrepreneurial Discovery process implementation as well. With this tool concerned, policy recommendations for the upcoming funding period and updates on the regional strategies can be drawn up.

Keywords: RIS3; Smart Specialisation; Benchmarking; Central Europe; Regional Innovation; Monitoring, Methodology; Common Set of Indicators

1. Introduction

In a rapid pace of transformation (digital, policy and environment driven) Europe is facing with, sustainability is a key towards Europe's future. Strengthening capitalisation of Smart Specialisation gets even more importance, when it comes to sustainable development in Europe and worldwide. Smart Specialisation and Regional Innovation Strategies on Smart Specialisation (RIS3) were used to serve for implementation of the Europe 2020 strategy and its goals, among them to harness the potential for Smart Growth from targeted support to areas with investments, thus prioritising direction and contribution for achieving Smart Growth ((COM(2010) 546 final). It was also used to serve as a methodology contributing to Sustainable Development Goals (SDGs) of the UN in the EU Member States and countries outside the EU. Indeed, the futured European concept of Smart Specialisation for the next programming period 2021-2027 highlights the sustainability dimension, which is regarded as a key driver in achieving and sustaining European competitive edge, in line with the European Green Deal (COM(2019) 640 final).

Though, the implementation of the next-generation sustainability strategy for Europe, the so-called "European Green Deal" as the new growth strategy for the EU requires strong policy report and significant investment plans. Yet, little is said about specific steps on how the strategy should be implemented on local and regional levels. In this light, the integration of Smart Specialisation as an EU policy to demonstrate efforts and potentials towards place-based innovation achievements for transformation and secure sustainable development becomes significant (Larosse et al., 2020). In this light, a strong knowledge and experience back-up – evaluation and monitoring – are crucial for the forthcoming funding period of 2021-2027, where the EU expects better performance and advancement of regional innovation. Therefore, monitoring is a key delivering relevant information base, supporting policy decision making and facilitating stakeholders' and citizens' engagement (Gianielle & Kleibrink. 2016, p. 95; Kleibrink et al., 2016, p. 1438; Mehta et al. 2019; Mazzanti et al., 2020; Mazzoni, 2020, Cismas et al., 2020; Khan et al. 2020). From the future perspective, this makes the current research *very topical*, as monitoring allows to counter measurement or steering related actions if they appear not to meet future perspectives.

Despite the recognised value of monitoring and evaluation within Smart Specialisation policy, in which monitoring and evaluation mechanisms build up the so-called 6th step of the RIS3 methodological framework, the related literature remains still scattered. Only few research and policy paper tracks support unfolding literature on RIS3 evaluation and monitoring (Arnold, 2004; EC, 2014; Gianelle & Kleibrink, 2015; Magro & Wilson, 2013; Masana et al., 2019; Panori et al., 2020; Prause, 2014). Literature on design and modelling (Boschma, 2014; Woronowicz

et a., 2016) as well as implementation of Smart Specialisation, i.e. process-based approach, is mounting, whereas monitoring and evaluation related issues are scarce (Gianelle & Kleinbrink, 2015). Indeed, this observation can be linked to an ex-ante conditionality the Smart Specialisation concept implies, where innovation policies are generated and implemented based on prioritised plans and follow in advance structured ways. Yet, monitoring and evaluation are crucial, as they foster policy learning, facilitate adaptation capability within a changing system, provide a solid basis for sustainable policy implementation (Aranguren et al. 2017; Gianelle & Kleibrink, 2016; Kroll et al., 2014; Magro & Wilson, 2015) and enable to reduce gaps in network structures (Virkkala et al., 2017).

Considering the fact that regional development remains at the core of each innovation policy, and regions should turn into learning ones by continuous improvement, knowledge region, facilitation of knowledge flow, ideas and learning (Florida, 1995, p. 532), monitoring and evaluation mechanisms appear to be crucial in order to make policy making in terms of Smart Specialisation solid and sustainable for the future (Kuznetsow & Sabel, 2003). Bearing this in mind, the research is driven by this *research problem* of the missing link between Regional Innovation Strategies for Smart Specialisation and their monitoring and evaluation mechanisms. Indeed, the existing evidence underlines that linking monitoring to the strategy's intervention logic places a significant challenge for policy makers and public programme officers (Farole et al., 2011, p. 1107; Kleibrink et al., 2016, p. 1456). A challenging nature bears also availability of data and identification of indictors to measure as well as a shared understanding and action among involved stakeholders (Kleibrink & Magro, 2018, p. 6). Indeed, indicators are important for sustainable development and planning performance measurement, thus implying positive changes at the end of the journey (Brugmann, 1997, p. 59). As a result, there is a huge emerging need for a systemic and holistic approach involving different governance mechanisms stakeholders.

Indeed, a marginalised focus on the monitoring and evaluation of RIS3 bears a rational academic and management practice-oriented researchers' response to provide a particular knowledge and data contribution in this rather porous research and policy field regarding RIS3. In that, the authors aim at giving more topical substance to RIS3 evaluation and monitoring by addressing and reducing the missing theoretical and practical foundations. When it comes to practice, evaluation and implementation of RIS3 on the regional level gets more blurred. Here, at is clearly stated, a common concept toward and a common set of indicators enabling benchmarking and thus monitoring of RIS3 on regional level are missing (Guzzo & Perianez-Forte, 2019, p. 18). This finding clearly postulates the research gap. As a result, the present research tackles the place-bound *research-to-practice gap*, where missing conceptual frameworks on RIS3 evaluation and monitoring on the regional level on the one hand dovetail with management tools regarding practical RIS3 evaluation and monitoring marshalled on the other hand.

The literature delivers only a limited number of records setting about regional dimension of RIS3 evaluation and monitoring, in particular within the cross-border, macro-regional perspective (INTERREG) and applied research orientation (regional development, SMEs competitiveness) (Angelidou et al., 2017; Bagienska & Rogowska, 2002; Woronowicz et al., 2016). Though, evaluation and monitoring efforts regarding RIS3 often remain in the design phase and usability of being deployed for tracing progress of RIS3 implementation is unexplored (Griniece et al., 2017, p. 4), followed by missing tools and methods reflecting the way in which the evaluation and monitoring can be used for the future policy revision and application (ibid., p. 6) and go beyond a narrow focus on meeting just audit requirements (Kleibrink et al., 2016, p. 1455). Finally, missing interlinking of policy approaches with theories frame the scientific research gap the authors want to address and reduce (Boschma, 2014; Foray et al., 2011).

The concerned research and practical management gaps were fuelled within the cross-border transnational (INTERREG) research project "SMART_watch" aiming at improving the links and between RIS3 monitoring and needs of end-users and involved stakeholders in RIS implementation. Within the framework of the Central Europe

Programme 2014-2020, the authors acting as work package leader for the design of policy recommendations pertaining to RIS3 evaluation and monitoring and future path of development. The research target groups include governance actors, like policy makers, triple or quadruple helix approach stakeholders (academia & research, government, industry and society) as well as current and potential users of RIS3, namely Small and Medium-Sized Enterprises (SMEs) and other businesses that build up the backbone of the regional economy. In this nexus, the present research raises two research question:

1) *How to compare and benchmark RIS3 performance of individual NUTS-2 regions within one European macro-region to enable cohesive and integrative future regional development driven by innovation?*

2) *How can a viable macro-regional and harmonised methodological and conceptual tool be constructed for comparison and benchmarking of individual NUTS-2 regions' performance in RIS3 implementation that goes beyond individual quantitative monitoring systems and indicators in Central Europe?*

As a result, using the empirical data from the participating Central Europe regions within the "SMART_watch", the researchers aim at developing qualitative conceptual and methodological frameworks that facilitate and enable policy actors and other stakeholders to undertake evaluation and monitoring of RIS3 implementation and equip them with toolkit enabling a reasonable decision-making. In particular, the authors propose a so-called common set of indicators dedicated to enable evaluation of RIS3 performance in a macro-regional perspective. In addition, the research proposes a benchmarking tool that can be transferred to and employed to other European regions. Indeed, the recent research is calling for more qualitative approaches and their use in participatory evaluation and monitoring (Kleibrink & Magro, 2018, p. 6). It is about harmonising conceptual frameworks and practical tools across EU NUTS 2 regions and making them functional in practice, thus empowering human capabilities to increase effectiveness of design and monitoring procedures in the future. By aiming at delivering the answer to the research question, the authors dovetail the research goals with the largely marginalised theoretical setting, which underpins the research scope and scale (evaluation and monitoring of the RIS3 implementation). Afterwards, the paper proceeds with the methodological considerations that are followed by comprehensive result presentation and discussion. Finally, implications for governance and stakeholder bodies involved in RIS3 evaluation and monitoring are displayed as well as research body on this particular field enhanced.

2. RIS3 evaluation and monitoring in policy and theory nexus

The overwhelming literature on Smart Specialisation, RIS and Innovation in Europe belong to the key building blocks that drive currently both researchers and practitioners. Yet, since Smart Specialisation refers to "policy running ahead of theory" (Foray et al., 2011, p. 1), academic approaches towards the conceptualisation have been so far highly marginalised, thus leading to missing manifestation of the concepts in the theoretical realm. Indeed, paramount scientific contributions on Smart Specialisation and RIS3 deliver rather policy-driven contributions that lack the dovetailing of the research with the existing and developing theories (Boschma, 2014; Fellnhofer, 2017). Paradoxically, as further development of RIS3 is subject to review for future improvements, current discourses shall highly demand strong proved theoretical foundations and not only focus on practice-driven approaches. In this regard, as well as with the aim to support topical discussion on RIS3 implementation evaluation and monitoring, the authors call for a solid systematic understanding deploying a bunch of applicable existing concepts and theories. For that reason, the researchers adopt a novel approach in the literature review of this paper by, first, conceptually linking up the intertwined policy discourses on RIS3 evaluation and monitoring province with applicable theoretical

treatises, and, second, providing a comprehensive but a simplified matrix with applicable theories that support and links research scope and scale through keywords.

2.1 Positioning RIS3 evaluation and monitoring in policy discourses

In order to make European economy more competitive against economies of US, Japan and other emerging world regions, such as China and South-East Asia, Europe made further attempts in advancing Europe's performance and regional development with the proposed strategy on smart, sustainable and inclusive growth in Europe – Europe 2020 strategy by the EC, followed by recent agendas to advance manufacturing and key enabling technologies "For a European Industrial Renaissance" (EC, 2014), and to prioritise community and customer experience in European innovation policy (EC, 2015). In this light, Smart Specialisation concept has moved from focusing solely on Research & Development (R&D) array towards a more *networked approach*, based rather on specific EU policy areas prioritisation and achievement of specific targets with the Europe 2020 strategy.

More than last three decades, discourses on Regional Innovation Systems (RIS) and strategic approaches towards Regional Innovation are ruling scholarly discourses as well as practical papers. A myriad of research papers and studies have evolved to underline the increasing role of innovation for European economy, in particular, cohesion, competitiveness and growth by means of RIS (Asheim et al, 2007; Asheim and Isaksen, 2002; Cooke & Morgan, 1997, Cooke, 2001). Following regional innovation agendas, in 2007-2008 a concept of "Smart Specialisation" was born, which addresses realisation of the European Research Area by means of development of *specialised clusters*, agglomeration of *knowledge resources* and building *knowledge hubs*, accompanied by *policy and institutional reforms*. It was launched by a team of experts working for the European Commission (EC) with the aim to provide new ways for recovery of European economy from the economic crisis and acceleration of European integration, including reduction of differences, assurance of more balanced evolvement of European regions as well as creation of the right conditions for *competition and cooperation* (EC, 2009; Foray et al., 2009; Giannitsis & Kager, 2009).

Smart Specialisation yields *integration of various stakeholders* from both public and private sector and postulates a complex *multi-level governance*. In the current funding period of 2014-2020, a concept of "Smart Specialisation" enjoys a growing interest on the European agenda, especially in order to safeguard sustainable and accountable use of EU Structural Funds (Iammarino et al., 2018), advance an outdated perception of regional innovation policy (Landabaso, 2014) and to bring more structured and legitimised way of proceeding by distributing EU funds (Foray, 2014; Kroll, 2019; McCann & Ortega-Argiles, 2013, 2015, 2016a, 2015b, 2015c) as an ex-ante conditionality for involved stakeholders (Griniece et al., 2017; Kroll, 2015; Martinez-Lopez & Palazuelos-Martinez, 2015). Not to forget, it is intended to streamline an *interplay and coordination* of the involved actors and stakeholders (Grillitsch, 2016; Larrea et al., 2919; Morgan, 2017; Panori et al., 2017).

Although evidence on Smart Specialisation and its growing popularity among policy makers is tremendous, majority of topical research and policy records appear to be circled around smart specialisation strategies and foresight (Paliokaite et al., 2015; Piirainen et al., 2017), consideration of place-based approaches (Kroll, 2015; Magro & Wilson, 2019) the role of institutions (Grillitsch, 2016), involvement of different level of governance (Arangunen et al., 2019) and regional institutional frameworks (Mazzucato, 2014; Krammer, 2017; Rodriguez-Pose et al., 2014). Within the evaluation and monitoring dimension of the EU RIS3 methodological framework, the key research streams also confirm the distribution of the keywords pertaining to governance, institutions, cooperation, collective learning, resource pooling and discovery. When it comes to the overview of keywords and their tailoring to specific theoretical approaches, concepts and theories, the following Table 1 heralds the key concepts driving the specific RIS3 area – evaluation and monitoring and their principal allocation to key theoretical foundations.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Table 1. Conceptual Keywords and their Provinces Driving RIS3 Evaluation and Monitoring Discourses

Keyword	Application Field	Application Meaning / Value	Conceptual Province	Research Record
(Re-) Definition of RIS3 outputs	Academics Policy makers Businesses	+ RIS3 governance improvement for future	+ Balanced scorecard + Business model innovation	+ Panori et al. (2020)
Decision-making (evidence-driven)	Policy makers	+ Strategic RIS3 management + RIS3 revision + Reducing information asymmetry, uncertainty and risk	+ Decision theory + Principal-agent theory + Game theory	+ Kleibrink et al. (2016) + Panori et al. (2020)
Participatory policy making and cooperation	Academics Policy makers Businesses	+ Informing about policy responses + Ensuring accountability & transferability of results + Participatory and inclusive approaches towards stakeholders	+ Network-based innovation theory + Open innovation	+ Kleibrink et al. (2016)
Entrepreneurial Discovery Process (EDP)	Businesses	+ Strengthening user-driven innovation + Engagement new actors in the EDP + Open platforms for cooperation + Attraction of talents	+ Open innovation + User-driven innovation + Design thinking + Service design	+ Cvijanovic et al. (2020)
Evaluation methods and criteria for RIS3	Policy makers	+ Means of learning & improvement for the future + Regional observation + Harmonised tools and data availability	+ Organisational learning + Absorptive capacity	+ Pires et al. (2019)
RIS3 Priority identification & investment horizons	Policy makers Businesses	+ Long-term prioritisation and planning + Anticipating long-term industrial and technological trends for transformation & emerging industries	+ Strategic foresight + Decision theory + Transaction Cost Theory	+ Ranga (2018) + Vezzani et al. (2018)
Policy learning and stakeholder communication	Policy makers	+ Learning from failure + Learning about transformation + Sustainable self-improvement cycles + Building & reinforcing trust and cooperation	+ Collective learning + Absorptive capacity + Path dependency	+ Bellini et al. 2020 + Kleibrink et al. (2016)
Stakeholders involvement and coordination in RIS3	Academics Policy makers Businesses	+ Developing programme for RIS3 monitoring improvement + Consultation, engagement and bottom-up participation + Support economically weaker regions with limited capacity for RIS3 monitoring through open engagement	+ Network-based innovation theory + Open innovation	+ Magro et al. (2014) + McCann (2015) + McCann & Ortega-Argiles (2016)

Source: Compiled by authors

The table above presents keywords and main concepts that are dominating in the literature and policy discourses when it comes to RIS3 evaluation and monitoring. The keywords and their interplay with the concepts and positioning with the theories are displayed in an alphabetic order not giving any specific weight to one or another. As this paper also serves for practical policy applications, it is intended to provide an overview and access to a basket key resources and theoretical foundations underpinning theoretical understanding.

2.2 Positioning RIS3 evaluation and monitoring in theoretical setting

The previous section contributes to embeddedness of the current research within the discourses of RIS3 evaluation and monitoring. In contrast to a myriad number of papers that deal with RIS3 and touch upon different aspects of RIS3, this paper concentrates on both understanding of RIS3 evaluation and monitoring from the conceptual and theoretical perspectives as well as delivering practical participatory tools. However, in order to easily trace and grasp key fundamental principles guiding RIS3 an especially its evaluation and monitoring is a colossal job. This is partly because of highly missing theoretical considerations in most of the scrutinised research literature, partly because of RIS3 standing for a highly complex phenomenon.

Innovation as the backbone of RIS3 is a theory and policy province showing intertwining of and integration with different concepts and theories. Because of its nature, innovation requires a tremendous understanding from different disciplines. Therefore, it is assumed that the most research misses a clear pinpointing of key applicable concepts and theoretical considerations by focusing mainly on general policy discussions. In order to facilitate the understanding and simplify the overview of the theoretical background, this present research has departed from the policy discussion and marshalling topical keywords that enable to trace the links with driving concepts and theories, innovation being the flagship and umbrella term. As a result, the authors of this paper argue, theoretical considerations can be circled around the following key building blocks bridging the gap in a comprehensive theoretical manifestation regarding RIS3 evaluation and monitoring, as compiled by the authors:

- Innovation (innovation generation, creative potential, openness, entrepreneurial discovery)
- Institutions, institutional arrangements and organisational culture (clusters, networks, hubs)
- Governance (multi-level horizontal cooperation, participatory inclusive stakeholder participation)
- Cognition, knowledge and learning (policy learning, participatory learning, absorptive capacity).

The core idea behind a systemic approach towards *innovation* is ex-ante strategic approach, a policy-driven way to spin off processes that enable both diversification, differentiation and new development paths. Already Schumpeter recognised the power of innovation for entrepreneurial activities by incessantly revolutionising economic structures in order to get better or more effective processes and products, the process known as "creative destruction". While doing so path dependency is an important precondition when defining strategy and patterns of organisational innovations (Schumpeter, 1947). Innovation and research in the 21st century both are increasingly becoming international endeavours and most innovations originate from multiple sources, with many drawings in components or technologies developed in multiple locations (Hayek, 2002). Potential evolutionary pathway of this innovation system is dependent on inherent structures and existing dynamics that have to do with the adaptation of radical transformation (Foray et al., 2012). Indeed, within the RIS3 multiple streams of insights on innovation intertwin. Whereas in early discourses innovations were regarded as those emerging only in firms, networks and clusters as well as multi-level and multi-cultural communities became sources in innovation process and enabled to combine internal and external knowledge bases (Pavitt 1984; Chesbrough 2003; Cooke, 2016; Asheim & Gertler 2005; Malerba 2005; Prause & Thurner 2014), approach actors at various spatial scales (Smith 2000; Tödtling et al. 2006), maintain different types of interactions and transfers (Gilsing et al. 2011) and focus on locally available capacities

and capabilities (Gertler & Levitte 2005; Boschma & Ter Wal 2007). As a result of differentiating socio-economic setting in Europe and especially on the regional level, in order to accelerate innovative capacity and overcome socio-economic obstacles there emerged a stronger need to address local and regional challenges (Courchene 1995; Porter 2000; Wolfe 2002).

By addressing key existing challenges in Europe, experts advocated use of smart specialisation process, i.e. particularise knowledge base in European regions (Foray & van Ark, 2008, p. 14). Actually, the idea of knowledge-based growth can be traced back also to learning and specialisation, which implies an interlinkage with the birth of evolutionary economics pointing out specialisation and learning as key drivers, e.g. within Adam Smith's "Wealth of Nations". Followed by profound treatises bridging learning and specialisation, like that of Schumpeter (1947), knowledge, technology and innovation are key sources enabling place-based specialisation (Fagerberg et al., 2004, Tiits et al., 2015; Ferreira & Seixas, 2019). In this light, an institutional perspective is important, since institutions play a crucial role in facilitating learning, knowledge spill-overs and specialisation itself. The key current challenges that jeopardise RIS3 evaluation and monitoring pinpoint a lack of matching needs between regional governance and actors involved in innovation discovery processes, lack of implementation of bottom-up approaches enabling participatory processes, lack of capability to design and implement RIS3 policies as well as capability to engage actively in the processes of entrepreneurial discovery (Capello & Kroll, 2016, p., 1397).

Indeed, local and regional challenges have been increasingly addressed by deploying the concept of RIS and clusters, which have seen a high rise among the place-based concepts (Aranguren et al., 2019). On the one hand, these concepts are bound to prevailing market forces, on the other hand, they presuppose a clear intertwining with the province of *governance* (Sotarauta, 2018). Indeed, in order to enable a smooth RIS3 implementation, actors from different sectoral arrangements are involved, like academic & research, policy, businesses (entrepreneurs) and society in large (quadruple helix-approach). Furthermore, a smooth RIS3 implementation is deemed to be bound to interaction and intra-institutional interplays among regional, national, supra- and subnational levels. Moreover, an efficient governance is deemed to be bound to path dependency. Certainly, when it comes to governance improvement for RIS3 evaluation and monitoring, ex-ante experiences gathered are crucial in shaping future decisions and future monitoring mechanisms (Aranguren et al., 2019; Boschma, 2015).

Governance easiness and level thereof is highly dependent on the institutional thickness and territorial capital. The last one makes a clear interlinkage to capacity and capabilities of institutions, which, in turn, are highly dependent on *knowledge base and absorptive capacity* (Cohen & Levinthal, 1990) or collective learning (Bellini et al, 2020). In this matter, absorptive capacity is crucial not only for RIS3 implementation but also for absorbing supply of research and innovation by local enterprises (SMEs) when designing and undertaking RIS3 evaluation and monitoring. In the same vein, the dovetailing of supply and demand sides, e.g. academic & research with local and regional SMEs and their needs might have a huge impact on the desire and ability of both sectors to work in the future (Kempton et al., 2013, p. 14). Certainly, lack of absorptive capacity for new knowledge and innovation as well as missing articulation of demand frequently results in less-innovative regions. It limits capacity and capabilities to access, acquire and apply new and external knowledge, cross-fertilise and making use of it on the market (Asheim et al., 2017, p. 9; Barzotto et al., 2019, p. 215). In fact, lack of strong governance structures and thin institutions without strong industrial clusters, networks and industry associations capable to supply with the needed information, knowledge and inputs (Fotakis et al., 2014, p. 35). In this regard, governance is crucial for connecting or reconnecting participants in RIS3 implementation to enable following evaluation and monitoring, as smooth cooperation among them is a key precondition for delivery of innovative, desirable and sustainable innovation outputs as well as generate a shared value. In addition, the integration of policy makers and experts within this dialog is also persuasive.

An overview of key theoretical concepts applicable for RIS3 evaluation and monitoring reveal that key challenges' blocks result from thin institutions and institutional arrangements covering governance, cognition and innovation processes. At the core of the challenging nature, there shall be discussed social aspects of actors' interactions pertaining to value delivery, shared value principals, leadership, asymmetric information flows, uncertainty, ambiguity, volatility, opportunism, bargaining power as well as transaction and monitoring costs issues. As a result, the authors call for the future research to build upon sound theoretical foundations, e.g. New Institutional Economies and related concepts and put the topic of RIS evaluation and monitoring in the tailored theoretical framework that enables to find practical challenge and problem-solving solutions.

3. Methodology

In the present research, the authors set out to forge a methodological / conceptual tool that supports RIS3 evaluation and monitoring on a macro-regional level by provide a practical method for benchmarking RIS3 implementation performance across the regional boundaries, i.e. by providing a harmonised tool. By scrutinising the topical literature, the researchers highlight that RIS3 evaluation and monitoring is to a great extent lacking conceptual foundations. As a result, the study applies hybrid research approach (Fereday & Muir-Cochrane, 2006, p. 80). Hereby, a combination of both inductive and deductive perspectives is done. From a deductive perspective, the research builds upon RIS3 evaluation and modelling approaches and traces key conceptual tenets. Subsequently, an inductive approach is used, since key insights from theory and practice are deployed to develop the methodological tool for practical applications. Indeed, the present research determines key building blocks and employs a specific structured approach by means of the developed outline (Fereday & Muir-Cochrane, 2006, p. 80; Crabtree and Miller, 1992, pp. 93-109). As a result, a methodological framework (common set of indicators) is constructed that is used for analysis and measurement as a certain template.

The research journey (design) encompasses the following key steps:
- Participating in the applied research project "SMART_watch" as key researchers regarding RIS3 evaluation and monitoring as well as policy recommendations.
- Developing tools for data gathering and monitoring within the project context, where the project serves as an overall case study.
- Gathering data from all 10 participation NUTS-2 regions from RIS3 reports (cases).
- Conducting expert interviews and making field notes in the frame of the project events (2018-2019).
- Analysing the gathered data by using thematic analysis method, social network analysis and memos.
- Undertaking thematic analysis of RIS3 evaluation and monitoring discourses and its positioning within the context.
- Distilling research streams and locating applicable concepts on RIS3 evaluation and monitoring only.
- Providing conceptual meanings of RIS3 evaluation and monitoring in the policy and theoretical nexus.
- Synthesising, comparing, smoothing and amalgamating data and presenting research results – set of indicators as a methodological tool for macro-regional RIS3 performance benchmarking.
- Validating research results.

Furthermore, the present scholarship has chosen a qualitative research approach. As noted by Kleibrink & Magro (2018), "*there is still a long way to go to systematically cope with this issue. This opens up room for the use of more qualitative approaches of participatory monitoring and evaluation*" (p. 6). By examining and interpreting data as well as determining key building blocks, the present research is able to comprehend the research phenomenon –

RIS3 evaluation and implementation within the regional discourses. With the qualitative research, a case study method is applied here (Yin, 2009, 2012), serving as an umbrella method and followed thematic analysis method (Braun & Clarke, 2006). Given the nature of the case study, the case study can be referred to as "building block" study on a phenomenon identifying common patters (Thomas, 2011, p. 515). In this, the research in hand is explorative, at it aims at contributing to the research field (RIS3 evaluation and monitoring, which seems to be underdeveloped (Shields & Rangarajan, 2013, pp. 26-27). In order to undertake an exploration, both integrative and interpretative syntheses techniques were introduced. Indeed, a synthesis has been achieved through pooling topical concepts in the research streams into higher-order conceptual approach (Dixon-Woods, 2005, p. 46).

In sum, it can be argued here that the present research was comprehensive, by addressing different aspects and combining diverse methodological perceptions applicable to the current research. Since the present research deals with innovation – a very complex phenomenon, research methodology needs also to underpin the comprehensive research nature. Yet, the authors made sound attempts in crystallising out research steps and endeavours.

4. Data synthesis – a way towards developing collective methodological tool

Reviewing the monitoring systems and especially the used indicators has shown, that the approaches in each participating region are overlapping in the methods. Namely, the following NUTS-2 regions were included in the analysis: Del-Alföld / Észak-Alföld (Ferenc et. al., 2013), Lubelskie (Sosnowski et. al., 2014), Mecklenburg – Western Pomerania (Strategierat Wirtschaft – Wissenschaft, 2014), Piemonte (Regione Piemonte, 2016), Slaskie (Matusiewicz, 2012), Slovenia - Eastern (Republika Slovenija, 2014), Styria (Kohrgruber, s.a.) and Veneto (Regione del Veneto, 2015). Regarding the indicators, in most regions two different types are used: output and result indicators. The labels may differ, some regions use the terms of performance or strategy indicators, but the idea behind is equal. One category of indicators refers to the results of the RIS3 implementation. They try to measure the direct impact of the implementation for the whole region by using key indices for innovation, research or economics – often measure in percentage. In some cases, the Regional Innovation Strategy provides a base value from 2011 and a target value for 2020. While Mecklenburg-Western Pomerania only published base values for 2011, the region of Silesia doesn't use base and target values.

The second category of indicators are related to outputs. They measure project specific values and provide a certain amount as target value to be reached in the funding period 2014 – 2020. All regions follow the idea to use such kind of indicators, but their definition or actual label can differ widely. Those indicators can be number of patents, EU financed projects, persons employed in a specific sector, companies with new business products, cluster, R&D subsidies, supported networks and so on. In preparation of the common set, some overlapping indicators could be identified, but considering the working steps after developing the set, this kind of indicators may lead to high challenges in the benchmarking.

To develop a joined set of indicators, the authors follow a conceptualisation influenced by various articles, such as Yazday et. al. (2009), Shahin & Mahbod (2007), Schwemlein et. al. (2016) and Maes et. al. (2016). In the first step, considered indicators have to be used at least in six regions. Since the indicators of the regions are not exactly labelled and measured the same. The resulting common set will be used as basic structure. In the second step, indicators which appear at least four and five times will be analysed individually. This second group can improve the amount and quality of the final set. But, for these indicators an explanation has to be provided to justify their contribution, since the amount of integration in the respective regions as reason is not feasible enough.

5. Displaying research results: methodological framework and harmonisation endeavours

As a result of research conducted, the authors analysed RIS3 documentation of 10 participating regions and provide the result overview in Table 2. The macro-regional indicator matrix, as showed in the table below, results from the comparison of the monitoring system in each region and the respective indicators. To create more add-value and flexibility regarding the upcoming benchmarking tool, the second set will be developed out of indicators, which are used by half of the regions. Both sets can be seen as final Common Set of Indicators.

The explained methodology leads in the first step to the following Table 2 with 15 indicators:

Table 2. Mapped Indicators in 10 analysed Central European regions

Name of indicator		
Expenditures on R&D at universities on GDP	Incidence of R&D expenditure on regional in GDP	Private investments to facilitate public support for R&D
Expenditures on R&D in private sector on GDP	Industrial SMEs introducing innovations as % of SMEs	Private sector spending on R&D as % of GDP
Expenditures on R&D in public sector and universities	No. of businesses with product and service innovations in % of SMEs	Public sector expenditure on R&D funded by business sector
Expenditures on R&D in public sector on GDP	No. of companies supported & cooperate with research institutes	Scientific employees
Incidence of R&D expenditure on national GDP	No. of patents and protection rights granted to national entities	Share of innovation-active companies

Source: Compiled by authors

To improve this set, the authors highlight the following indicators, which are used in at least four or five regions of the project consortium's regions:
- Spending on innovation in companies in the industry and service sectors other than R&D
- Share of R&D employees in private sector
- Number of companies supported diversifying product portfolio
- Number of companies supported introducing new products to the market
- Increase in business innovation activities.

The listed indicators are highly related to the Entrepreneurial Discovery Process and are able to measure the performance of it in the regions. Entrepreneurial Discovery Processes are one of the main phases of implementing Smart Specialisation Strategies. It is seen as a potential specialisation in which the knowledge contributed by the entrepreneur does not concern a technical invention (Larosse, 2013). Rather, it will relate to a new area of specialisation beneficial for the locale, given its existing productive assets (Forey, 2012). To cover this crucial part of the implementation process, the mentioned indicators will be added to the Common Set.
Therefore, the suggested Common Set of Indicators can be listed as in Table 3 below:

With the derived Common Set of Indicators, the Benchmarking of the chosen regions can be implemented. The set is used as required database for the benchmarking. For regions, the necessary (and available) data was collected and

standardised to create one final index for comparison of the implementation of regional Smart Specialisation Strategies.

Table 3. Common Set of Indicators

List of Indicators			
Expenditure on R&D in public sector and universities	Incidence of R&D expenditure on regional in GDP	No. of companies supported and diversifying product portfolio	Private sector spending on R&D as % of GDP
Expenditures on R&D at universities on GDP	Increase in business innovation activities	No. of companies supported and introducing new products to the market	Public sector expenditure on R&D funded by business sector
Expenditures on R&D in private sector on GDP	Industrial SMEs introducing innovations as % of SMEs	No. of patents and protection rights granted to national entities	Share of innovation-active companies
Expenditures on R&D in public sector on GDP	No. of businesses with product and service innovations in % of SMEs	Number of scientific employees	Share of R&D employees in private sector
Incidence of R&D expenditure on national GDP	No. of companies supported & cooperating with research institutes	Private investments to facilitate public support for R&D	Spending on innovation in companies in industry & service sectors other than R&D

Source: Compiled by authors

Additionally, we estimated a structure index covering the regional starting points in 2013 and 2014. This allows a better assessment of the final benchmarking index and comparison between relatively different regions.

Since the indicators are not available via one well-known dataset, scoreboard or scientific paper, different sources were taken into consideration for gaining necessary values. This also leads to different approaches to standardise the data as written in the following subchapters.

Following the idea of the methodology that yields to create a Common Set of Indicators, all indicators will be weighted depending on their frequency of use in the regions. Together with the normalised value, we receive a score for each indicator in all participating regions (ref. to Rickman & Schwer, 1995). However, the final benchmarking index will be estimated by the mean of all scores, as shown in the equation:

$$b_r = \frac{\sum_{i=0}^{n} m_i * x_{ri}}{n}$$

where b_r is the benchmarking index for the region r, m_i describes the multiplier for the indicator i and x_{ri} the normalised value for indicator i for the region r. The sum in the counter will be divided by the number of indicators n to achieve the final benchmarking index for the region.

In the following subchapters, the methodology for the multiplier, the normalised values and the structure index will be explained in detail.

Indicator Multiplier

Following the presented idea of collecting a common set for indicators to measure the implementation of Smart Specialisation Strategies, we can differ between different classes of indicators due to their frequency of appearance in the different regional monitoring systems. As an example, we want to take out the indicators "private sector spending on R&D in percent of GDP" and "share of R&D employees". While the first one is used as indicator for RIS3 implementation in all regions or is at least adoptable to one used indicator, the second one is only used in around 60%. Therefore, the value of the first indicator will have a higher influence on the final benchmarking score due to the mentioned multiplier m_i. The following Table 4 shows the multiplier for every indicator of the common set:

Table 4. Common Set of Indicators

Name of indicator	Weight
Expenditures on R&D at universities on GDP	1,2
Expenditures on R&D in private sector on GDP	1,2
Expenditures on R&D in public sector and universities	1,2
Expenditures on R&D in public sector on GDP	1,2
Incidence of R&D expenditure on national GDP	1,2
Incidence of R&D expenditure on regional in GDP	1,2
Increase in business innovation activities	0,6
Industrial SMEs introducing innovations as % of SMEs	1,0
No. of businesses with product and service innovations in % of SMEs	1,2
No. of companies supported & cooperate with research institutes	1,2
No. of companies supported diversifying product portfolio	0,6
No. of companies supported introducing new products to the market	0,6
No. of patents and protection rights granted to national entities	1,0
No. of scientific employees	1,2
Private investments to facilitate public support for R&D	1,0
Private sector spending on R&D as % of GDP	1,2
Public sector expenditure on R&D funded by business sector	1,2
Share of innovation-active companies	1,0
Share of R&D employees in private sector	0,6
Spending on innovation in companies in the industry & service sectors other than R&D	0,8

Source: Compiled by authors

Basically, indicators that are taken into consideration in all regional monitoring system receive a multiplier of 1,2. The weights are fixed according to the amount of appearances (Berger & Bristow, 2009). Whenever a region is missing, we subtract 0,2, which means that a multiplier of 0,6 is given to an indicator, that is not used by three regions.

Introducing a multiplier helps to generate a more feasible final benchmarking score, since a good performance in an often-used indicator in monitoring systems is appreciated in the final score as well. On the opposite a low used indicator doesn't prosecute bad performance that much.

Normalised Values for Indicators
To yield comprehensible values for all indicators across the respective regions, the authors collected the necessary data through four different methods by using different data sources. All four ways of data gaining are presented in the following subchapters. However, the authors preferred the first option that follows directly the regional monitoring system of each region. Nevertheless, only a few normalised values could be taken out from this option. This results in a lack of information out of the regional strategy papers, which do not provide all necessary information to trace the idea of the respective region on how to get the data / values.

Values from regional Smart Specialisation Strategy Documents
By analysing the regional strategy documents in the frame of the development of a Common Set of Indicators, a collection of the used values for all regions was developed. In some regions, the responsible institutions for implementing the Smart Specialisation Strategy defined start and target value of the indicators used in the monitoring system for the current funding period. This allows an easy measurement of the implementation by comparing the defined target value for 2020 with the latest value, that is provided for the respective indicator. Having this in mind, the value x_{ir} can be obtained as follows:

$$x_{ir} = \frac{t_{ir} - s_{ir}}{y_{ir} - s_{ir}}$$

where t_{ir} and s_{ir} are the target (2020) and starting value (2014) defined by the regions. y_{ir} is the latest value the authors were able to collect for the respective indicator. Therefore, equation (2) describes the resulting value as rate of the difference between planned performance and actual performance. If the region is able to achieve the planned target value, the value for the indicator would be $x_{ir} = 1$, while underperformance yields in $x_{ir} < 1$. However, $x_{ir} > 1$ is also a possible value, but it should be reminded, that the target values are defined for 2020 and the latest values are mostly accessible for 2018, which means that the data demands a two years gap.

Normalised Data via Regional Innovation Scoreboard 2019
Since not all regions provide the necessary information to follow previous options and / or the strategy paper do not present the methodology how the data was normalised or from which sources it was taken, another option has to be considered to get the necessary data for a useful benchmarking.

As it is shown in the Annex I, some indicators of the common set can be represented via indicators that are used in the Regional Innovation Scoreboard. The scoreboard is provided by the European Commission on a yearly basis, by analysing the NUTS2 regions. This allows us, to use the latest available data from a validated data source (Hollanders et. al., 2019).

The Scoreboard provides three information to create the normalised values for the respective indicators. Therefore, we can use different approaches to obtain the demanded normalised value. The first option is used, whenever the Scoreboard provides the data in relation to the European and national level of the respective indicator:

$$x_{ir} = \frac{(e_{ir} + l_{ir}) * 0,007}{2}$$

where e_{ir} is the score taken out from the Regional Innovation Scoreboard for the respective region in relation to the European level and l_{ir} the score in relation to national level. The values are multiplied with 0,007, since we assume 0,7 as value for the mean performance in the frame of Smart Specialisation implementation. By dividing the score in the counter with 2, we obtain the normalised value for the indicator of the respective region.

As second option, we use the provided value for some indicators, which are not related to European and National level. In this case, the mean of all European NUTS2 regions was calculated by the authors from the Regional Innovation Scoreboard. Having the European mean value and the regional value, we can obtain the normalised value for the benchmarking by using:

$$x_{ir} = 0,007 * \frac{z_{ir}}{m_i}$$

where z_{ir} is the value taken out from the Scoreboard and m_i the calculated European mean for the respective indicator i. Again, we are multiplying 0,7 since we assume that this is the value for mean performance. This assumption follows the Lithuanian Ministry of Education and Science (2010) labelling $67 - 74$ % as an average performance.

Normalised Data via Regional Competitiveness Index
In addition to the Regional Innovation Scoreboard 2019, data from the Regional Competitiveness Index were used to fulfil the database for the benchmarking tool as shown in the Annex I. The Competitiveness Index is also a yearly provided source for NUTS regions to measure the competitiveness performance and readiness in business sectors (Annoni & Dijkstra, 2019).

The Index provides a value for every European NUTS2 region. Therefore, the same method can be used as earlier in option two for the Regional Innovation Scoreboard. Therefore, we use again

$$x_{ir} = 0,7 * \frac{y_{ir}}{m_i}$$

where y_{ir} is the value taken out from Competitiveness Index and m_i the calculated European mean of all regions for the respective indicator i. As mentioned before, we are multiplying 0,7 as value for mean performance.

Normalised Data via EuroStat
As third validated data source, EuroStat as official statistical institution of the European Commission located in Luxembourg was used to obtain the remaining data (European Commission, 2019). Once again, for every region and the respective indicator, a value could be taken out from the database. Therefore, the equation is nearly the same as before:

$$x_{ir} = 0,7 * \frac{a_{ir}}{m_i}$$

where a_{ir} is the value taken out from EuroStat and m_i the calculated European mean of all regions for the respective indicator i. The fraction is multiplied with 0,7 due to the mentioned assumption of mean performance.

Normalised Data using a combination of data sources
For some indicators, none of the shown methods were feasible. This results in a lack of information / data or in the understanding of the indicators content. Therefore, the authors conduct for the following indicators an individual approach to obtain normalised data:

- Incidence of total R&D expenditures on GDP.

To achieve a normalised value for this indicator, we use a combination of the previous shown methods. This includes data from the Regional Innovation Scoreboard and Eurostat. The equation is built as follows:

$$x_{4r} = \frac{(0{,}007 * (l_{5r} * l_{6r}) + x_{7r})}{3}$$

where l_{5r} is the value from the Scoreboard in relation to national level for the indicator "expenditures on R&D in private sector referring to GDP", l_{6r} the value from the Scoreboard in relation to national level for the indicator "expenditures on R&D in public sector referring to GDP" and x_{7r} the value for "expenditures on R&D at universities referring to GDP" taken from EuroStat by using the presented method.

Incidence of R&D expenditures on regional GDP
The normalised value for this indicator follows directly from the presented above. To obtain the normalised value additional data from the Regional Innovation Scoreboard is used.

$$x_{3r} = x_{4r} * \frac{GDP_n}{GDP_r}$$

where GDP_n is the national and GDP_r is the regional Gross Domestic Product taken out from the Regional Innovation Scoreboard. That means, we multiply the value for indicator No. 4 with the relation between national and regional GDP to obtain a normalised value for this indicator.

Structure Index
The Structure Index is based on an idea and tool published on the S3-platform by the European Commission. It tries to identify the characteristics in terms of structural conditions for the participating regions at the beginning of the Smart Specialisation funding period 2014 – 2020 (Navarro et. al. 2014). Those characteristics are seen as fixed in the short term and reflect the way innovation and economic evolution happen in the region. However, for the developed benchmarking tool described in this report, the provided structure benchmarking tool is not sufficient, since it shows the 35 nearest regions from all European NUTS2 regions to the selected one. This doesn't allow a comparison between the participating regions which are highly different what excludes them in the provided tool.

To solve this problem, we access the data from Regional Innovation Scoreboard and Regional Competitiveness Index. The database described for the European structure tool can be covered in a sufficient way by the two mentioned data sources. To obtain a structure index, we use the final scores from 2013 and 2014 from the data sources. Therefore, the structure index u_r can be written as

$$u_r = \frac{(RIS_r^{2013} + RCI_r^{2014})}{2}$$

where, RIS_r^{2013} is the total index score for the region from the Regional Innovation Scoreboard in 2013 and RCI_r^{2014} is the total score for the region taken from the Regional Competitiveness Index.

6. Methodological framework in practice – benchmarking RIS3 performance in Central Europe

By using the described methodology, the research yields the following result table for the regions:

Table 5. Benchmarking results

Region	Structure Index	Benchmarking Index
D./E.-Alföld	-0.19425	0.4841
Jihozápad	0.1928	0.5383
Lubelskje	-0.1297	0.5135
Mecklenburg Western-Pomerania	0.53495	0.6689
Piemonte	0.3194	0.8307
Silesia	0.05105	0.4425
Slovenia – Eastern	0.3407	0.6158
Styria	0.63685	0.8965
Veneto	0.29255	0.6333

Source: Compiled by authors

As best performing region Piemonte can be indicated with the highest performance value, followed by Styria and Mecklenburg Western-Pomerania. Latter regions have the highest Structure Index compared to all regions, but obviously lose their front positions to Piemonte, which is starting from an average point in the frame of the Structure Index with 0.3194. Slovenia – Eastern possesses a well comparable Structure Index with 0.3407, but can't provide the same level of performance according to the Benchmarking Index.

Furhermore, the regions Lubelskje and D./E.-Alföld provide a negative Structure Index due to the negative value taken from the Regional Competitiveness Index. However, both regions obtain an average score overtaking Silesia, which started with a value of 0.05105 and is indicated as region with the lowest performance.

In the following, we will edit the benchmarking in two scenarios to create an analysis on specific fields. We will compare the Benchmarking Index from Table 5 as standard value with the yielding index after editing. An increase of the Benchmarking Value leads to the interpretation that the respective region is under-performing in the chosen field, since we exclude low values. In return, if the Benchmarking Index decreases, we can assume that the respective region is well performing, since we excluded high values.

To provide a clearer performance measurement, the indicators related to the GDP shall be excluded. Due to their measurement, that is relying on spending compared to regional and / or national GDP, it could lead to a bias in the performance measurement. Therefore, the seven respective indicators are excluded to obtain the Benchmarking Index. Table 6 shows the results.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Table 6. Benchmarking results after excluding GDP related indicators

Region	Structure Index	Benchmarking Index	Benchmarking Index (without GDP indicators)
D./E.-Alföld	-0.19425	0.4841	0.4000
Jihozápad	0.1928	0.5383	0.4985
Lubelskje	-0.1297	0.5135	0.3873
Mecklenburg Western-Pomerania	0.53495	0.6689	0.5633
Piemonte	0.3194	0.8307	0.6674
Silesia	0.05105	0.4425	0.4396
Slovenia – Eastern	0.3407	0.6158	0.6431
Styria	0.63685	0.8965	0.7965
Veneto	0.29255	0.6333	0.6235

Source: Compiled by authors

Table 6 shows that only Silesia and Slovenia – Eastern can increase their score after excluding GDP-related indicators. The remaining regions suffer a decrease. The highest decrease can be seen for the region Piemonte, that leaded the first measurement with all indicators. The interpretation behind the realised scores is as follows, regions with a decreased score spend an amount of money to facilitate Smart Specialisation implementation that is not corresponding to the realised performance. On the other way around, those regions – Silesia and Slovenia – Eastern – have an over-performing related to their spending in relation to the GDP.

In another scenario, we exclude those indicators that are linked to Entrepreneurial Discovery Processes (EDP) (Larosse, 2013). As mentioned earlier, we identified five identified five indicators which are directly connected to EDP. Table 7 shows the yielded results.

Table 7. Benchmarking results after excluding EDP indicators

Region	Structure Index	Benchmarking Index	Benchmarking Index (without EDP indicators)
D./E.-Alföld	-0.19425	0.4841	0.5526
Jihozápad	0.1928	0.5383	0.6054
Lubelskje	-0.1297	0.5135	0.6057
Mecklenburg Western-Pomerania	0.53495	0.6689	0.7804
Piemonte	0.3194	0.8307	0.9556
Silesia	0.05105	0.4425	0.4878
Slovenia – Eastern	0.3407	0.6158	0.6758
Styria	0.63685	0.8965	1.0321
Veneto	0.29255	0.6333	0.6808

Source: Compiled by authors

1376

Those regions, that suffer from a decrease can be attested a good performance in EDP implementation since their high values are excluded in this scenario. However, only Lubelskje provides a mentionable decrease of the value and can be identified as best performing region in terms of EDP. In return, Styria, Piemonte and Mecklenburg Western-Pomerania provide the highest increase in their Benchmarking Index. The logical interpretation leads to an under-performance in terms of EDP in those regions, since we excluded low values measuring EDP.

7. Conclusions

The first research objective of this paper was to elaborate and analyse how a comparable benchmarking of NUTS-2 regions for their Smart Specialisation implementation can be established as a crucial step for future regional development and innovation policies. Given the topicality of the transition to the new funding period and launch of European growth strategies such as the European Green Deal, monitoring and evaluation of RIS3 and its missing theoretical concepts and scientific foundation was analysed within the undertaken research. The introduced methodological framework including a common set of indicators steps in to the gap of missing collaborative approaches of European NUTS-2 regions.

As a second research objective, the paper in hand provides a conceptual and methodological tool for performance comparison of individual NUTS-2 regions RIS3 implementation. The conducted research analysed and elaborated the positioning of RIS3 monitoring in contrast with latest policy discourses and theoretical settings. So far, a unified concept as well as the link between Smart Specialisation policy approach and theoretical concepts for monitoring was missing. The tool fills in this gap and contributes to the current political discourse on innovation policy governances and policy learning for future Smart Specialisation Strategy development and implementation.

The benchmarking methodology is considered for a limited number of regions in the frame of the Regional Implementation on Smart Specialisation Strategies (RIS3). After a detailed review of the published regional strategy documents, the presented monitoring systems and their indicators were used for a comparison and measurement of the appearance for each indicator. We emphasised a set containing 20 indicators to measure Smart Specialisation. To collect the necessary data, we focused on the provided measurement in the regional strategy documents. However, due to the fact, that regions partly did not provide detailed explanation how they collected the data (ref. to Ferenc et. al., 2013, Sosnowski et. al., 2014 and Strategierat Wirtschaft – Wissenschaft, 2014) we introduced a method to receive the necessary data from well-validated databases. To enlarge the result analysis, enable sufficient data interpretation and provide a better performance comparison, Structure Index of each regions are included, which shall cover the "starting point" for each region at the beginning of the Smart Specialisation funding period 2014 – 2020.

By using the explained Benchmarking method, we received first results on the performance, indicating Piemonte with the highest value. After editing the set of indicators by excluding GDP related values, we provided the assumption, that except Silesia and Slovenia – Eastern have a spending to facilitate the implementation of Smart Specialisation, which is not corresponding to the measure outcomes / performance. This is a crucial insight in the development of political recommendations for adjustments of the current regional strategies.

Furthermore, we analysed the implementation of EDPs by editing the indicators. The result table has shown, that Lubelskje region is best-performing of the analysed regions. For the weak performing regions such as Silesia, Slovenia – Eastern and D./E.-Alföld the implementation of EDP in the funding period was not successful and should receive a higher focus in the development of the upcoming regional strategies.

The presented approach for Benchmarking provides a flexible methodology, which can be generalised on every NUTS-2 regions and even on smaller and larger scale. However, the methodology is limited in the number of regions that are considered to develop a set of indicators. Since regional development in terms of innovation and the regional policies behind are highly different, the methodology will not provide a sufficient set if the number of regions is too high. Nevertheless, it is a valid measurement to benchmark a certain number of different regions. The methodology may be used especially for neighbour regions to derive recommendations in the implementation processes and facilitate cross-border insights.

References

Angelidou, M., Komninos, N., Passas, I., Psaltoglou, A. & Tsarchopoulos, P. (2017). Monitoring the Impact of Smart Specialisation Strategies across EU Regions. Proceedings of International Conference for Entrepreneurship, Innovation and Regional Development Conference, pp. 343-353, Thessaloniki, Greece.

Annoni, P. & Dijkstra, L. (2019). The EU Regional Competitiveness Index 2019.

Aranguren, M.J., Morgan, K. & Wilson, J. (2017). Implementing RIS3 – The Case of the Basque Country, Cuadernos Orkestra.

Aranguren, M.J., Magro, E., Navarro, M. & Wilson, J. (2019). Governance of the territorial entrepreneurial discovery process: looking under the bonnet of RIS3, Regional Studies, 53(4), 451-461, https://doi.org/10.1080/00343404.2018.1462484

Arnold, E. (2004). Evaluating research and innovation policy: A systems world need systems evaluation. Research Evaluation, 13(1), 3-17.

Asheim, B., Grillitsch, M., & Trippl, M. (2017). Smart specialization as an innovation-driven strategy for economic diversification: Examples from Scandinavian regions. In Advances in the theory and practice of smart specialization (pp. 73-97). Academic Press.

Asheim, B. T., & Isaksen, A. (2002). Regional innovation systems: the integration of local 'sticky' and global 'ubiquitous' knowledge. The Journal of Technology Transfer, 27(1), 77-86.

Asheim, B. & Gertler, M. (2005). The geography of innovation, The Oxford handbook of innovation, pp. 291-317.

Asheim, B., Coenen, L., & Vang, J. (2007). Face-to-face, buzz, and knowledge bases: sociospatial implications for learning, innovation, and innovation policy. Environment and planning C: Government and Policy, 25(5), 655-670.

Bagienska, A. & Rogowska, P. (2020). Smart Specialisation Strategy – bibliometric analysis & GoSmart BSR project practices. Academy of Management, 4(1), 90-105.

Barzotto, M., Corradini, C., Fai, F. M., Labory, S., & Tomlinson, P. R. (2019). Enhancing innovative capabilities in lagging regions: an extra-regional collaborative approach to RIS3. Cambridge Journal of Regions, Economy and Society, 12(2), 213-232.

Bellini, N., Lazzeri, G., & Rovai, S. (2020). Patterns of policy learning in the RIS3 processes of less developed regions. Regional Studies, 1-13.

Berger, T. & Bristow, G. (2009). Competitiveness and the Benchmarking of Nations – A critical reflection. In: International Advances in Economic Research, November 2009, https://doi.org/10.1007/s11294-009-9231-x

Boschma, R. (2015). Towards an evolutionary perspective on regional resilience. Regional Studies, 49(5), 733-751.

Boschma, R. (2014). Constructing regional advantage and smart specialisation: Comparison of two European policy concepts. Scienze Regionali.

Boschma, R.A. & Ter Wal, A.L.J. (2007). Knowledge networks and innovative performance in an industrial district: The case of a footwear district in the South of Italy, Industry and Innovation, 14(2), 177-199.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative research in psychology, 3(2), 77-101.

Brugmann, J. (1997): Is there a method in our measurement? The use of indicators in local sustainable development planning. In: Local Environment – The International Journal of Justice and Sustainability, 2, 59-72. https://doi.org/10.1080/13549839708725512.

Capello, R., & Kroll, H. (2016). From theory to practice in smart specialization strategy: emerging limits and possible future trajectories. Planning Studies, 24(8), 1393-1406.

Chesbrough, H. (2003). Open Innovation: The New Imperative for Creating and Profiting from Technology. Boston: Harvard Business School Press.

Cismas, L.M., Miculescu, A., Negrut, L., Negrut, V., Otil, M.D., & Vadasan, I. (2019). Social Capital, Social Responsibility, Economic Behavior and Sustainable Economic Development – An Analysis of Romania's Situation. Transformations in Business & Economics, 18(2A (47A)), 605-627.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. Administrative science quarterly, 128-152.

Cooke, P, & Morgan, K. (1997). The Associated Economy: Firms Regions and Innovation. Oxford University Press.

Cooke, P. (2001). Regional innovation systems, clusters, and the knowledge economy. Industrial and corporate change, 10(4), 945-974. https://doi.org/10.1093/icc/10.4.945

Cooke, P. (2016). Four minutes to four years: the advantage of recombinant over specialized innovation–RIS3 versus 'smartspec'. European Planning Studies, 24(8), 1494-1510.

Courchene, T. J. (1995). Glocalisation: the regional / international interface. Canadian Journal of Regional Science, 18(1), 1-20.

Crabtree, B. F., & Miller, W. L. (1992). Research methods for primary care. Doing Qualitative Research, 3.

Cvijanović, V., Griniece, E., Gulyás, O., Reid, A. & Varga, H. (2020). Stakeholder engagement through entrepreneurial discovery? Lessons from countries and regions in Central and Eastern Europe, Cogent Social Sciences, 6(1), https://doi.org/10.1080/23311886.2020.1794273

Del Castillo J., Barroeta B. Y & Paton J. (2013): Entrepreneurial Discovery (ED) and Smart Specialisation: theory and reality. 12th International Entrepreneurial Forum. Vilnius – Lithuania. Retrieved from https://www.redalyc.org/pdf/5143/514351601001.pdf.

Dixon-Woods, M., Agarwal, S., Jones, D., Young, B. and Sutton, A. (2005). Synthesising qualitative and quantitative evidence: a review of possible methods. Journal of Health Services Research & Policy, 10(1), 45–53B.

European Commission (2008). Knowledge for Growth. European Issues and Policy Challenges.

European Commission (2010). Europe 2020 Flagship Initiative Innovation Union, Communication from the Commission, October 06, 2010, from https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52010DC0546.

European Commission. (2014a). For a European Industrial Renaissance, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2014) 14 final. Brussels.

European Commission (2019a). The European Green Deal, Communication from the Commission, December 11, 2019, from https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1588580774040&uri=CELEX:52019DC0640 .

European Commission (2019b). Eurostat. Database last accessed on 25.10.2019.

Fagerberg, J., Mowery, D. C., & Nelson, R. R. (Eds.). (2004). The oxford handbook of innovation. Oxford: Oxford University Press.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Farole, T., Rodriguez-Pose, A. & Storper, M. (2011). Cohesion Policy in the European Union: Growth, Geography, Institutions, Journal of Common Market Studies, 49(5), 1089-1111. https://doi.org/10.1111/j.1468-5965.2010.02161.x

Fellnhofer K. (2017). Evidence revisited: Literature on smart specialisation calls for more mixed research designs, International Journal of Knowledge-Based Development, 8(3), 229-248.

Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. International journal of qualitative methods, 5(1), 80-92.

Ferreira, F., & Seixas, P. C. (2019). The Case for Smart Specialization Strategies (RIS3) as an Instrument for Place-Based Policies: Excavating the New Regional Development Paradigm. In Smart Specialization Strategies and the Role of Entrepreneurial Universities (pp. 131-152). IGI Global.

Ferenc, B., Tamás, G., Péter, M., István, M. & László, S. (2013). Del-Alföld Intelligens Innovációs Szakosodási Stratégiája. Retrieved from: http://www.darinno.hu/wp-content/uploads/2015/01/2212-26-da_s3_v3_20130325_tars.egyeztetes.pdf.

Florida, R. (1995). Toward the Learning Region, Futures, 27(5), 527-536.

Foray, D., & Van Ark, B. (2008). Overview on Knowledge for Growth: European issues and policy challenges, pp. 6-15. Office for Official Publications of the European Communities.

Foray, D., David, P. A., & Hall, B. (2009). Smart specialisation – the concept. Knowledge economists policy brief, 9(85), 100.

Foray, D., David, P. A., & Hall, B. H. (2011). Smart specialisation from academic idea to political instrument, the surprising career of a concept and the difficulties involved in its implementation (No. REP_WORK). EPFL.

Foray, D. (2012). Smart Specialisation: the Concept. Smart Specialisation Conference, Sofia (Bulgaria).

Foray, D., Goddard, J., Beldarrain, X.G., Landabaso, M., McCann, P., Morgan, K., Nauwelaers, C. and Ortega-Argil.s, R. (2012). Guide to Research and Innovation Strategies for Smart Specialisations (RIS3), European Commission, Luxembourg.

Foray D. & Goenega X. (2013). The goals of smart specialisation. European Commission. JRC Scientific and Policy Report EUR 26005 EN 2013. Retrieved from http://ressources.aunege.fr/nuxeo/site/esupversions/efb22d92-ef97-4c7b-ac02-eb9c6a86570c/res/ForayGoenaga2013.pdf.

Foray, D. (2014). From smart specialisation to smart specialisation policy. European Journal of Innovation Management, 17(4), 492- 507. https://doi.org/10.1108/EJIM-09-2014-0096

Fotakis, C., Rosenmöller, M., Brennan, J., Matei, L., Nikolov, R., Petiot, C., & Puukka, J. (2014). The role of Universities and Research Organisations as drivers for Smart Specialisation at regional level. EU Directorate-General for Research and Innovation.

Gault, F. (2013): Handbook of Innovation Indicators and Measurement – Chapter 1: Innovation indicators and measurement: an overview. Retrieved from: https://doi.org/10.4337/9780857933652

Gertler, M. S., & Levitte, Y. M. (2005). Local nodes in global networks: the geography of knowledge flows in biotechnology innovation. Industry and Innovation, 12(4), 487 - 507.

Gianelle, C. & Kleibrink, A. (2015). Monitoring Mechanisms for Smart Specialisation Strategies, S3 Policy Brief Series No. 13/2015. JRC Technical Reports.

Gianelle, C. & Kleibrink, A. (2016). Monitoring innovation and development strategies – Stakeholder involvement, learning and sustainable policy cycles, Governing Smart Specialisation.

Giannitsis, T. & Kager, M. (2009). Technology and Specialization: Dilemmas, Options and Risks? Expert group 'Knowledge for Growth'.

Grillitsch, M. (2016). Institutions, smart specialisation dynamics and policy. *Environment and Planning C: Government and Policy*, 34(1), 22 -37. https://doi.org/10.1177/0263774X15614694.

Griniece, E., Panori, A., Kakderi, C., Komninos, A. & Reid, A. (2017). Methodologies for Smart Specialisation Strategies: A View across the EU regions, Proceedings of International Conference for Entrepreneurship, Innovation and Regional Development, pp. 321- 330, 31.08.-01.09.2017, Thessaloniki, Greece.

Guzzo, F. & Perianez-Forte, I. (2019). Smart Specialisation at work: evidences from Peer eXchange and Learning workshops. JRC Technical Reports. European Commission. December 2019. https://doi.org/10.1080/09654313.2016.1181717

Hayek, F.A. (2002). Competition as a Discovery Procedure, The Quarterly Journal of Austrian Economics, 5(3), 9-23.

Hollanders, H.; Sadki, N. & Merkelbach, I. (2019). The Regional Innovation Scoreboard.

Kempton, L., Goddard, J., Edwards, J., Hegyi, F. B., & Elena-Pérez, S. (2013). Universities and smart specialisation. S3 Policy Brief Series, 3.

Khan, S., Maqbool, A., Haleem, A., & Khan Mohd, I. (2020). Analyzing critical success factors for a successful transition towards circular economy through DANP approach. Management of Environmental Quality: An International Journal, 31(3), 505-529. https://www.emerald.com/insight/content/doi/10.1108/MEQ-09-2019-0191/full/html

Kitchin, R., Laurialt T.P. & McArdle, G. (2015) Knowing and governing cities through urban indicators, city benchmarking and real-time dashboards. In: Regional Studies, Regional Science, 2, 6-28. https://doi.org/10.1080/21681376.2014.983149.

Kleibrink, A., Gianelle, C. & Doussineau, M. (2016). Monitoring innovation and territorial development in Europe: emergent strategic management. European Planning Studies, 48(8), 1438-1458.

Kleibrink, A., & Magro, E. (2018). The making of responsive innovation policies: varieties of evidence and their contestation in the Basque Country. Palgrave Communications, 4(1) https://doi.org/10.1057/s41599-018-0136-2

Kohrgruber, K. (s.a.). Economic Strategy Styria 2025. Retrieved from: https://s3platform.jrc.ec.europa.eu/regions/at22/tags/at22.

Krammer, S. (2017). Science, technology, and innovation for economic competitiveness: The role of smart specialization in less-developed countries, Technological Forecasting & Social Changes, 123, 95-107. http://dx.doi.org/10.1016/j.techfore.2017.06.028

Kroll, H., Muller, E., Schnabl, E. & Zenker, A. (2014). From Smart Concept to Challenging Practice – How European Regions Deal with the Commision's Reqquest for Novel Innovation Strategies, Working Papers Firms and Region No. R2/2014.

Kroll, H. (2015). Efforts to Implement Smart Specialization in Practice—Leading Unlike Horses to the Water, European Planning Studies, 23(10), 2079-2098. https://doi.org/10.1080/09654313.2014.1003036

Kroll, H. (2019). Eye to eye with the innovation paradox: why smart specialization is no simple solution to policy design, European Planning Studies, 27(5), 932-951. https://doi.org/10.1080/09654313.2019.1577363

Kuznetsov, Y., & Sabel, C. (2017). Managing self-discovery: Diagnostic monitoring of a portfolio of projects and programs. In Advances in the Theory and Practice of Smart Specialization, pp. 51-72. Academic Press. https://doi.org/10.1016/B978-0-12-804137-6.00003-6

Landabaso, M. (2014). Guest editorial on research and innovation strategies for smart specialisation in Europe. European Journal of Innovation and Management, 17(4), 378-389.   https://doi.org/10.1108/EJIM-08-2014-0093

Larosse, J. (2013). The discovery of smart specialisation. REGLAB Smart Regions Seminar.

Larosse, J., Corpakis, D. & Tuffs, R. (2020). The Green Deal and Smart Specialisation, Version 4, February 20.

Larrea, M., Estensoro, M. & Pertoldi, M. (2019). Multilevel governance for Smart Specialisation: basic pillars for its construction, JRC Technical Reports. https://doi.org/10.2760/425579

Lopez-Rodriguez, J., & Martínez López, D. (2014). Beyond the R&D effects on innovation: the contribution of non-R&D activities to TFP growth in the EU. IEB Working Paper 2014/16.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Maes J., Liquete C., Teller A., Erhard M., Paracchini M.L., Barredo J.I., Grizzetti B., Cardoso A., Somma F., Petersen J.E., Meiner A., Gelabert E.R., Zal N., Kristensen P., Bastrup-Birk A., Biala K., Piroddi C., Egoh B., Degeorges P. & Fiorina C. (2016). An indicator framework for assessing ecosystem services in support of the EU Biodiversity Strategy to 2020. In: Ecosystem Services, Vol. 17, pp. 14 – 23.

Magro, E., Navarro, M., & Zabala-Iturriagagoitia, J. M. (2014). Coordination-mix: The hidden face of STI policy. Review of Policy Research, 31(5), 367-389.

Magro, E. & Wilson, J.R. (2013). Complex innovation policy systems: Towards an evaluation mix. In: Research Policy, 42(9), 1647-1656. http://dx.doi.org/10.1016/j.respol.2013.06.005

Malerba, F. (2005). Sectoral systems of innovation: a framework for linking innovation to the knowledge base, structure and dynamics of sectors, Economics of Innovation and New Technologies, 14(1-2), 63-83.

Masana, R. E., & Fernández, T. (2019). Monitoring S3: Key dimensions and implications. Evaluation and program planning, 77, 101720. https://doi.org/10.1016/j.evalprogplan.2019.101720

Matusiewicz, A. (2012). Regional Innovation Strategy oft he Slaskie Voivodeship – for the years 2013 – 2020. Retrieved from: https://s3platform.jrc.ec.europa.eu/regions/pl22/tags/pl22

Mazzanti, M., Mazzarano, M., Pronti, A., Quatrosi, M. (2020). Fiscal policies, public investments and wellbeing: mapping the evolution of the EU. Insights into Regional Development, 2(4), 725-749. http://doi.org/10.9770/IRD.2020.2.4(1)

Mazzoni, F. (2020). Circular economy and eco-innovation in Italian industrial clusters. Best practices from Prato textile cluster. Insights into Regional Development, 2(3), 661-676. https://doi.org/10.9770/IRD.2020.2.3(4)

Mazzucato, M. (2014). A mission-oriented approach to building the entrepreneurial state. A 'Think Piece'for the Innovative UK. Technology Strategy Board: London, UK

McCann P. & Ortega-Argilés R. (2011): Smart Specialisation, Regional Growth and Applications to EU Cohesion Policy ECONOMIC GEOGRAPHY WORKING PAPER 2011: FACULTY OF SPATIAL SCIENCES, UNIVERSITY OF GRONINGEN. Retrieved from http://diposit.ub.edu/dspace/handle/2445/116560.

Ministry of Education and Science of the Republic of Lithuania (2010): Education in Lithuania. Derived from: https://www.sac.smm.lt/wp-content/uploads/2016/02/Education_2010_eurosh.pdf

McCann, P. & Ortega-Argilés, R. (2013). Modern regional innovation policy, Cambridge Journal of Regions, Economy and Society. https://doi.org/10.1093/cjres/rst007

McCann, P. & Ortega-Argilés, R. (2015). Smart Specialization, Regional Growth and Applications to European Union Cohesion Policy, Regional Studies, 49(8), 1291 - 1302, https://doi.org/10.1080/00343404.2013.799769

McCann, P., & Ortega-Argilés, R. (2016a). Smart specialisation, entrepreneurship and SMEs: issues and challenges for a results-oriented EU regional policy. Small Business Economics, 46(4), 537-552.

McCann, P. & Ortega-Argilés, R. (2016b). The early experience of smart specialization implementation in EU cohesion policy, European Planning Studies, 24(8), 1407-1427. https://doi.org/10.1080/09654313.2016.1166177

McCann, P. & Ortega-Argilés, R. (2016c). Smart Specialisation: Insights from the EU Experience and Implications for Other Economies, Journal of Regional Research, 36, 279-293.

Mehta, P., Singh, M., & Mittal, M. (2019). It is not an investment if it is destroying the planet: A literature review of socially responsible investments and proposed conceptual framework. Management of Environmental Quality: An International Journal, 31(2), 307-329. https://www.emerald.com/insight/content/doi/10.1108/MEQ-08-2019-0176/full/html

Morgan, K. (2017). Nuturing novelty: Regional innovation policy in the age of smart specialisation, Environment and Planning C: Politics and Space, 35(4), 569-583. https://doi.org/10.1177/0263774X16645106.

Navarro, M., Gibaja, J., Franco, S., Murciego, A., Gianelle, C., Hegyi, F. & Kleibrink, A. (2014). Regional benchmarking in the smart specialisation process: Identification of reference regions based on structural similarity. S3 Working Paper Series No. 03/2014, JRS Technical Reports.

OECD (2019). Innovation-driven Growth in Regions: The Role of Smart Specialisation. Retrieved from http://www.oecd.org/sti/inno/smartspecialisation.htm.

Paliokaite, A., Martinaitis, Z. & Reimeris, R. (2015). Foresight methods for smart specialisation strategy development in Lithuania, Technological Forecasting & Social Change, 101, 185-199. http://dx.doi.org/10.1016/j.techfore.2015.04.008

Panori, A., Komninos, N., Kakderi, C. & Fellnhofer, K. (2017). Smart Specialisation Strategies: An online platform for strategy design and assessment. RelStat 2017. Springer Lecture Notes in Networks and Systems.

Panori, A., Kakderi, C., Komninos, N., Fellnhofer, K., Reid, A. & Mora, L. (2020). Smart systems of innovation for smart places: Challenges in deploying digital platform for co-creation and data-intelligence, Land Use Policy, https://doi.org/10.1016/j.landusepol.2020.104631.

Pavitt, K. (1984). Sectoral patterns of technical change: towards a taxonomy and a theory, Research Policy, 13, 343-373.

Piirainen, K., Tanner, A.N. & Alkaersig, L. (2017). Regional foresight and dynamics of smart specialization: A typology of regional diversification patterns, Technological Forecasting & Social Change, 115, 289-300. http://dx.doi.org/10.1016/j.techfore.2016.06.027

Pires, S.M., Polido, A., Teles, F., Silva, P. & Rodrigues, C. (2019). Territorial innovation models in less developed regions in Europe: the quest for a new research agenda? European Planning Studies. https://doi.org/10.1080/09654313.2019.1697211

Porter, M. (2000). Location, Competition and Economic Development: Local Networks in a Global Economy, Economic Development Quarterly, 14 (1), 15–34.

Prause. G. (2014). Smart Specialisation and EU Eastern Innovation Cooperation: A Conceptual Approach. Baltic Journal of European Studies Tallinn University of Technology, 4, (1 (16)). https://doi.org/10.2478/bjes-2014-0001.

Prause, G. & Thurner, T. (2014). User Communities – Drivers for Open Innovation, Foresight – Russia, 8(1), 24–32.

Rajnoha, R., Lesnikova, P., Stefko, R., Schmidtova, J., & Formanek, I. (2019). Transformations in Strategic Business Planning in the Context of Sustainability and Business Goals Setting. Transformations in Business & Economics, (18 (47)), 44-66.

Ranga, M. (2018) Smart specialization as a strategy to develop early-stage regional innovation systems, European Planning Studies, 26 (11), 2125 – 2146. https://doi.org/10.1080/09654313.2018.1530149

Regione del Veneto (2015). Smart Specialisation Strategy della Regione del Veneto. Retrieved from: https://s3platform.jrc.ec.europa.eu/regions/ith3/tags/ith3.

Regione Piemonte (2016). Strategia per la specializzazione intelligente der Piemonte. Retrieved from: https://s3platform.jrc.ec.europa.eu/regions/itc1/tags/itc1.

Republika Slovenija (2014). Smart Specialisation Strategy of the Republic of Slovenia. Retrieved from: https://s3platform.jrc.ec.europa.eu/regions/si/tags/si.

Rickman, D. & Schwer, R. (1995). "A comparison of the multipliers of IMPLAN, REMI and RIMS II: Benchmarking ready-made models for comparison". In: The Annals of Regional Science, 29, 363-374. https://doi.org/10.1007/BF01581882

Rodríguez-Pose, A & Wilkie, C. (2014). Institutions and the Entrepreneurial Discovery Process for Smart Specialisation, Papers in Evolutionary Economic Geography, 15.23, Utrecht University.

Scheerens, J. (2012). Perspectives on Education Quality, Education Indicators and Benchmarking.

Schumpeter, J. (1947). Innovation: the creative impulse. Journal of Economic History, Vol. 7(2), pp. 149 - 59.

Schwemlein S., Cronk R. & Bartram J. (2016). Indicators for Monitoring Water, Sanitation and Hygiene: A Systematic Review of Indicator Selection Methods. International Journal of Environmental Research and Public Health, 16, https://doi.org/10.3390/ijerph13030333

Shahin A. & Ali Mahbod M. (2007). „An integration of analytical hierarchy process and goal setting". In: International Journal of Productivity and Performance Management. 56(3), 236-240. https://doi.org/10.1108/17410400710731437

Smith, K. (2000). Innovation as a systemic phenomenon: rethinking the role of policy, Enterprise and Innovation Management Studies, 1(1), 73 - 102.

Sosnowski, S., Hetman, K., Grabczuk, K., Cholewa, M., Sobczak, J., Pękalski, T., Walasek, A., Mocior, E., Habza, A., Janczarek, P., Bartuzi, K., Bożeński, E., Bryda, K., Byzdra, I., Donica, D., Franaszek, P., Kawałko, B., Nakielska, I., Orzeł, Z., Pieczykolan, A., Rudnicki, W., Sokół, M., Struski, S. & Szych, H. (2014). Ragional Innovation Stratgey for the Lubelskie Voivodeship 2020 – Regional Innovation Strategy for Smart Specialisation (RIS3). Retrieved from: https://s3platform.jrc.ec.europa.eu/regions/pl31/tags/pl31.

Sotarauta, M. (2018). Smart Specialisation, Shared Vision and Policy Traps. Sente Working Papers, 40.

Strategierat Wirtschaft – Wissenschaft (2014). Regionale Innovationsstrategie 2020 für das Land Mecklenburg-Vorpommern. Retrieved from https://s3platform.jrc.ec.europa.eu/regions/de8/tags/de8.

Tiits, M., Kalvet, T., & Mürk, I. (2015). Smart specialisation in cohesion economies. Journal of the Knowledge Economy, 6(2), 296-319.

Thomas, G. (2011). A typology for the case study in social science following a review of definition, discourse, and structure. Qualitative inquiry, 17(6), 511-521.

Tödtling, F., Lehner, P. & Trippl, M. (2006). Innovation in knowledge intensive industries: The nature and geography of knowledge links, European Planning Studies, 14(8), 1035–1058.

Vezzani A., Baccan M., Candu A., Castelli A., Dosso M., Gkotsis P. (2017). Smart Specialisation, seizing new industrial opportunities. JRC Technical Report, European Commission. https://doi.org/10.2760/485744

Virkkala, S., Mäenpää, A., & Mariussen, Å. (2017). A connectivity model as a potential tool for smart specialization strategies. European Planning Studies, 25(4), 661-679.

Wolfe, D. (2002). Social Capital and Cluster Development in Learning Regions. In: J. A. Holbrook & D. Wolfe (Eds.). Knowledge, Clusters and Regional Innovation: Economic Development in Canada, Montreal and Kingston, London, Ithaca: School of Policy Studies, Queens University, pp. 11-38.

Woronowicz, T., Boronowsky, M., Wewezer, D., Mitasiunas, A., Seidel, K. & Cotera, I.R. (2017). Towards a Regional Innovation Strategies Modelling, Proceedia Computer Science, 104, 227-234. https://doi.org/10.1016/j.procs.2017.01.118

Yazday J., Panopalis P., Gillis J.Z., Schmajuk G., MacLean C.H., Wofsy D. & Yelin E. (2009). A Quality Indicator Set for Sytematic Lupus Erythematosus. In: Arthritis & Rheumatism (Arthritis Care & Research). 61(3), 370-377. https://doi.org/10.1002/art.24356

Yin, R. K. (2011). Applications of case study research. sage.

Yin, R. K. (2009). Case Study Research: Design and, London: Sage Publications.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Acknowledgements

Short biographical note about the contributors at the end of the article (name, surname, academic title and scientific degree, duties, research interests):

Laima GERLITZ, PhD. Laima Gerlitz is a researcher at Wismar University of Applied Sciences: Technology, Business and Design and PhD Student at Tallinn University of Technology within the fields of project, design and transport related management. Since 2014, Laima Gerlitz is researching on her PhD topic "Design as Success Factor for Innovation, Competitiveness and Smart Growth". Key fields of research are design and innovation, strategic design management, design management for enterprises, competitiveness and value creation deriving from design-driven approaches in organisational settings, particularly in the context of small manufacturing and high-tech enterprises and start-ups.
ORCID ID: orcid.org/0000-0002-7127-7678

Christopher MEYER, M.Sc. Christopher Meyer coordinates several European research projects at the European Project Center associated to the University of Wismar. After his master degree in public economics, he started his studies as PhD Candidate at TalTech University in Tallinn, Estonia, elaborating the impact of Smart Specialisation on the Blue Economy of the Baltic Sea Area.
ORCID ID: orcid.org/0000-0002-6048-1198

Prof. Dr. Gunnar PRAUSE is a professor at the Tallinn School of Economics and Business Administration at Tallinn University of Technology (TU) Tallinn in Estonia as well as at Hochschule Wismar, University of Applied Sciences: Technology, Business and Design in Wismar, Germany. Professor Gunnar Prause has published widely internationally and has many years of experience in carrying out national and European (research) projects.
ORCID ID: orcid.org/0000-0002-3293-1331

REINFORCING COMPARATIVE MONITORING OF SMART SPECIALISATION PERFORMANCE ACROSS EUROPEAN REGIONS: TRANSNATIONAL RIS3 OBSERVATORY MODEL AS A TOOL FOR SMART SPECIALISATION GOVERNANCE[*]

Christopher Meyer [1,2]

[1] *Hochschule Wismar, University of Applied Sciences: Technology, Business and Design,*
Philipp-Müller-Str. 14, 23966 Wismar, Germany
[2] *Tallinn University of Technology (TalTech)*
Ehitajate tee 5, 19086 Tallinn, Estonia

E-mails: [1]christopher.meyer@hs-wismar.de; [2]chmeye@ttu.ee

Abstract. Smart Specialisation is dedicated to be a key driving force for entrepreneurial discovery and innovation in the European innovation policy paradigm in line with the European Strategy 2020 and the funding period 2014-2020. At the current stage, all EU NUTS-2 regions are monitoring their individually developed Regional Innovation Strategies on Smart Specialisation (RIS3) including monitoring systems that are needed to adjust upcoming future RIS3 strategies in the new funding periods. Despite the thematic topicality, the procedure of RIS3 evaluation and monitoring lacks a sound supra-regional approach when it comes to RIS3 implementation performance governance and institutional arrangements across all European regions. In fact, the blurring of RIS3 monitoring can be traced back to the policy nature that monitoring systems are set up, implemented and evaluated on individual regional and or national basis including a set of regionally tailored regional and national indicators. With regard to the policy challenges and research gaps of developing, and, later, using a joint macro-regional systemic institutional approach towards RIS3 implementation and monitoring, this paper provides a conceptual model for RIS3 performance, evaluation and monitoring governance based on case study analysis, best practices from RIS3 research and policy stakeholders' interviews. It is intended to serve as a comprehensive and comparative governance model on regional, national and

European level, which fosters the institutional thickness and institutional multi-level horizontal cooperation among institutions involved in RIS3 performance and monitoring implementation. Within the empirical narrative, 10 NUTS-2 regions within the INTERREG Central Europe Programme area and in the frame of the "SMART_watch" project were subject to the analysis pertaining to their strategy design, priority axes and monitoring indicators. As a result, the so-called Transnational RIS3 Observatory Model was designed, which yields conceptual linkages to theoretical concepts using cluster theories as well as builds upon practical policy-driven approaches mushrooming in the innovation policy paradigm of the European Union. Furthermore, recommendations to foster the RIS3 policy implementation in the upcoming funding period are introduced in line with the setup of the observatory structure and its institutional embeddedness.

1. Introduction

The Smart Specialisation approach is one of the key pillars of the Europe 2020 Strategy in terms of economic development and growth policy thinking (McCann & Ortega-Argilés, 2011) as well as an approach to avoid dissipation of European Union (EU) funds among regions (Rusu, 2013). The basic idea can be traced back to the rising productivity gap between Europe and the USA in mid 90's, when European policy makers had to look for alternative policies to impede further economic decline. After announcing the Regional Innovation on Smart Specialisation (RIS3) initiative as a new novel policy on European level, all NUTS-2 regions were given an opportunity to develop individual strategies according to the available top-down policy agenda as well as design sufficient monitoring systems. With the ending of the funding period 2014-2020, RIS3 strategies will be monitored on achievements regarding successful RIS3 policy implementation. As a result, a bunch of recommendations to amend RIS3 shall be provided for the future EU funds' programming period and respective institutions and bodies involved in strategies' future design and implementation.

To continue sustainable development in Europe, the European Green Deal was announced as the new growth strategy for the EU towards a more sustainable economic and society (European Commission, 2019). This strategy aims at covering all key driving EU economic sectors by introducing new growth opportunities and activities. However, new strategic governance capacities are required for successful implementation (Larosse et. al., 2020). The Smart Specialisation approach follows the same idea to identify and use regional potentials to support innovative and competitive development. Therefore, Smart Specialisation policy can serve as a key pillar in the European governance transformation to reach the objectives of the European Green Deal until 2050. Thus, a specialisation by the regions using Key Enabling Technologies (KETs) or Knowledge Intensive Business Services (KIBs) to particular fields or priorities is unavoidable. The Baltic Sea Region serves as a flagship region among other EU macro-regions showing efficient and effective resource pooling and utilisation of capacities to reduce current challenges, e.g. in the maritime shipping and transportation area or innovation development in SMEs (Gerlitz, 2016). Currently, all European regions are revising their strategies for the next funding period starting in 2021 and pertaining to future regional innovative growth, including the elaboration to improve the RIS3 policy implementation (Gianelle et. al., 2020). Within this discourse, monitoring experiences frame a key focus and serve as an information pool for any potential future changes needed to be introduced by policy makers.

Therefore, it is crucial moment right now to revise the monitoring systems of the regions in between the funding periods.

Due to the existence of individual region-based monitoring systems according to regional requirements, the results of current monitoring approaches lack any comparability. This bears a clear *problematic nature*. Moreover, some European Member States have introduced national strategies reinforcing regional ones or substituting them. As a result, the regional and national level considerations cannot be excluded from the current research discourse. Controversy, regional policy-making involved in innovation has a very limited impact on the Research and Innovation Strategies on Smart Specialisation (RIS3) programming (Marques and Morgan, 2018) due to risk-averse behaviour that restricts experimentation, flexibility and public initiatives as well as leads to being threatened due to the transparent bottom-up approach in the programme (Landabaso, 2014). Nevertheless, regional bodies play an important role for informal factors in institutions such as trust, responsibility, partnerships and regional leadership (McCann & Ortega-Argilés, 2014). In addition, innovation systems are proved to have the strongest impact on NUTS-2 levels (Ruhrmann et. al., 2020). Thus, a lack of successful and open-minded innovation policy governance impedes the set-up of Smart Specialisation strategies and their monitoring. Albeit, the European Smart Specialisation approach does not provide a framework on policy governance (Capello & Kroll, 2016). Hence, the need for an acceptance of the mutual action and reaction roadmap among institutions forging regional development and innovation is growing, including actual positioning, responsibilities' sharing as well as pinpointing cause and consequence relations, which at the current stage are unknown (Morgan, 2016). In this light, the practice-based model that is acknowledged among 10 NUTS-2 regions and is proposed by this research is seen as referred to as a contribution surpassing a simple necessity to meet this particular challenge.

The paper in hand displays the research done on evaluation and monitoring processes in line with RIS3 implementation by addressing the *research gap* of a missing comprehensive and comparative monitoring method and concept for RIS3 implementation across the whole European Union (EU). As a result, the present research contributes to the still missing theoretical and conceptual framework when it comes to Smart Specialisation (Andersons & Bushati, 2019). In the current funding period, the European Commission used a benchmarking based on structural similarities only (Navarro et. al., 2014), but did not focus on the actual implementation performance. Therefore, this research raises the following research question: *How can a functional model be implemented across the EU on all necessary levels (European, National [optional] and Regional) that enables Smart Specialisation monitoring for the regional innovation policy implementation?*

This paper is organised as follows. In the next chapter, the main theories used for this research will be presented. Key references to underline the theories as well as research gap are incorporated to this chapter. Next, the used research methodology including its scope and characteristics is provided. The fourth chapter includes the research results and the actual development of the Transnational RIS3 Observatory Model as tool of Smart Specialisation governance, ending with a concluding section summing up main insights and further research proposal.

2. Theoretical Background

The monitoring of RIS3 performance was not tackled in detail by previous literature. Mora et. al. (2019) identified current scientific trends in research on smart specialisation, but did not indicate any increasing numbers of scientific work on monitoring activities, despite the fact that monitoring became more relevant at the end of current funding period. Gianelle & Kleibring (2015) arrange monitoring activities in the overall implementation context for smart specialisation implementation. Further, Marti et. al. (2020) analysed the key next steps to

support region's capacities in evaluation and monitoring of smart specialisation outputs. In addition, they highlighted the need to introduce better mechanisms to compare the processes and outcomes across regional borders. In this light, the present paper aims to fill this identified gap of missing monitoring approaches that integrate all relevant actors on regional, national and European level.

Further literature proposes solutions to foster or analyse the individual monitoring processes on regional or national level, such as Gulc, 2015; Angelidou et. al., 2017; D'Adda et. al., 2019; Cismas et al., 2019;; Jasinska, & Jasinski, 2019, Rane Santosh,& Thakker Shivangi, 2019). Kogut-Jaworska & Ociepa-Kicinska, 2020; Adeleke Abayomi et al., 2020).

Masana & Fernández (2019) introduce the term "learning" to the monitoring process and the European Commission indicates examples as best practices for regional monitoring (European Commission, 2020). However, all screened literature proposals lack performance measuring comparability with (all) other European regions in terms of RIS3. Acevedo (2019) presents dimensions to compare smart specialisation development of one specifically chosen region with others, but the approach is not transferable on a general level. Furthermore, innovation measurements like the EU 2020 Innovation indicator cannot be seen as a feasible instrument for RIS3 performance measurement due to the focus on innovation outcomes only (Janger et. al., 2017).

The present paper proposes a model filling the identified research gap with the transnational RIS3 Observatory Model approach by using clustering construct. Clusters are interconnected companies and institutions in a particular thematic field with a certain geographic concentration (Porter, 1998), but can also be elaborated as tools for regional development as a reduced scale innovation system (Gagnidze, 2015). The European Commission highly supports cluster strategies within the European growth strategy 2020 (European Commission, 2016a; Ketels & Protsiv, 2016; El Idrissi et al., 2020). Pavone et. al. (2020) recently published an analysis on clustering NUTS-2 regions according to their specialisation strategies.

In addition to cluster theories, innovation policy governance concepts are considered for the model development. Innovation policies in line with RIS3 are meant to be a multilevel approach, containing stakeholders' involvement according to the quadruple-helix approach that pools together various actors within the innovation system governance (Aranguren et. al., 2019). Mainly, the Entrepreneurial Discovery Processes (EDP) combines the interaction of all actors and their different levels under one innovation policy and transforms the strategy to reality in the regions (Grillitsch, 2016). Another key pillar is the RIS3-driven policy learning (Gianelle et. al., 2019), the ability to transform theoretical concepts to innovation policies and implement policy changes to support the regional (innovative and sustainable) development.

The presented model is based on both theoretical concepts – cluster theories and innovation policy governance – and pinpoints synergies from both concepts which can generate further add-value. In addition, enhancers of smart economic development such as networking, learning, innovation and knowledge facilitation are considered to be inherent in the model (Dagiliene et. al., 2019). Furthermore, the transnational RIS3 observatory Model fulfils the proposed requirement by the European Commission (2016b) that any Smart Specialisation Strategy programme demands a multi-scalar-co-ordination among supra-national, national and sub-national actors in Europe.

3. Research Methodology

The present paper provides inductive perspectives, analysing chosen regions on their strategy design, implementation and monitoring to identify key insights to explain a phenomenon on the European level. Furthermore, with the analysed cases, this research paper deviates and constructs applicability and transferability options for all regions of the European Union.

Taking the proposed research gap into account, the argumentation of Creswell (2014) using qualitative approaches to explain and analyse a concept or phenomena can be followed. In the field of Smart Specialisation research, qualitative research approaches are preferred to explain political interventions on innovation governances (such as Björn & Johansson, 2017; Georghiou et. al., 2014; Komninos et. al., 2014; and Kroll et. al., 2016). The research strategies implemented can be classified according to the research onion of Saunders et. al. (2009) as the following:
- Case studies,
- Action Research, and
- Grounded theory.

The conducted research paper is using case studies of the "SMART_watch" project and participating regions representing European NUTS-2 regions. At a first glance, the regions were analysed individually using their published Regional Innovation Strategies on Smart Specialisation. Especially the chosen priority axes and monitoring systems with used indicators were scrutinised in the analysis, developing an overview on same priorities among the regions. In the next step, responsible bodies and their duties within the strategy implementation were considered, investigating for best practices to be adopted and transformed for other regions. Therefore, the case studies were highly funnelled into the main part of the implemented research, while action research and grounded approaches accounted for rather a lower share on the overall research process.

Action research was used after the first analysis of the strategy document of individual EU region to explore structural units within the model as a problem-solving approach. The stated issue on a missing comparability with existing monitoring systems can only be overcome with major organisational and governmental changes in line with the Smart Specialisation policy. The necessary information and insights have been gained in cooperation with practical actors (Huang, 2010) within the work done in the "SMART_watch" project and conducted short surveys and expert interviews. In contrast, grounded theory, according to Charmaz (2014), perceived as method to construct theories and recommendations from analysing qualitative data was incorporated to the research when developing conclusions and theories on improvements for Smart Specialisation monitoring systems based on the actual existing data within the regional strategies.

Based on this multi-method research methods, further literature reviews identified the mentioned research gap as well as actual regional needs and circumstances to implement a sufficient monitoring model, which ensures regional performance comparability of all European regions. Therefore, four research techniques can be summarised as basis of this paper:
- Research scope: 2018 – 2020, SMART watch applied research project
- Research methods: case studies, action research and grounded theory
- Research actions: desk research, empirical data analysis followed by comparative analysis, surveyed regions, expert interviews and relating document analysis
- Research approach: qualitative
- Research types: analytical, qualitative, exploratory, practice-based and conceptual.

As a result, this paper is regarded to contribute to inductive research streams, and can be found within the philosophical perspective of constructivism and interpretivism of the researcher (ref. to Creswell, 2013).

In sum, in order to construct a practice-driven model that is intended to be used in the future, a mixed approach is at the heart of the research, where the researcher is obliged to compare, balance out and pick up the right approaches. Since this paper is a result of the applied research project, it heralds rather high applicability and transferability potential, which, indeed, can be underpinned through a systemic combination of methods, tools and approaches in the research methodology journey, as discussed above.

4. Designing the transnational RIS3 observatory model and positioning it within the current discourse

As introduced, cluster theories are used to build up the structure of the presented transnational RIS3 Observatory Model. Having the used definition of cluster by Porter (1998) and earlier mentioned recommendation to unify priority axis in mind, it is possible to align several clusters within a NUTS-2 region according to the individually chosen priority axis. As an example, the region of Mecklenburg Western-Pomerania has identified six priority axes in its RIS3 document for 2014 - 2020, so we would introduce six so called "RIS3 cluster" for it according to our model, which of course interact between each other as well on a sub-national level.

Based on the implemented qualitative analysis (case studies) in line with the "SMART_watch" project and 10 NUTS-2 regions analysed, several similarities of RIS3 implementation were indicated, e.g. in chosen priority axes, monitoring systems, observatory structures, etc. A comparison of the chosen regional priorities led to the conclusion that NUTS-2 regions have very similar axis and themes that partly only differ in their labels (e.g. "Health & Life Sciences" vs. "Life Sciences"). For the upcoming funding period, an early recommendation to be made is an unification of priority axis to create more common particular fields in the smart specialisation implementation. For the model development, this unification is one of the main requirements to create sufficient clusters between European NUTS-2 regions.

The structure of the conducted model is built around a main actor as managing body – the Transnational RIS3 observatory. It could be interpreted as managing position for a certain number of regional RIS3 clusters. This kind of cluster management structure was indicated as "cluster of clusters" by Keller (1996). Portnoy (2004) emphasises such structure as managing a cluster of classic. However, a thematic managing body on a trans-national level to coordinate the regional RIS3 clusters.

The conducted model is considering any individual regional preferences in terms of Smart Specialisation. Therefore, every region is still developing an own strategy, integrating a detailed regional SWOT-analysis (or similar tools) to derive priorities like it is recommended by the European Commission (Foray et. al., 2012) and includes the involvement of regional stakeholders as vertical and horizontal network (Roman et. al., 2018).

In addition, as a result from the case study analysis, the model proposes to announce one representative / institution responsible for one specific priority axis. Some regions already follow this recommendation, but for a sufficient model implementation it is necessary to have such experts acting as contact and decision maker for each priority. The Trans-national RIS3 observatory body is the key element in conducted model structure and could be understood as a cluster organisation or platform. Such institutions shall be implemented to improve innovation and competitiveness of a specific cluster (Christensen et. al., 2012). From the authors' point of view, a Trans-national RIS3 observatory needs at least the mentioned three main bodies below:

Management Committee:

Implementing a Management Board is a well recommended aspect for strategic leadership and competitiveness (Elenkov et. al., 2005) and already included in all analysed RIS3 documents as case studies. The Management Committee should consist of the representatives from each region under the observatory.

The main task for this committee is the administrative management of all actions in relation with the respective priority in their regions. In addition, the committee is responsible for coordinating the Smart Specialisation implementation activities in a cross-regional cooperative way. Furthermore, the on-gong implementation of the monitoring system is one of the key actions to be done by this committee. This includes to indicate future trends and obstacles for the respective thematic priority.

EU – cross communication body:

The second body is mainly responsible for the external communication of results, action plans, events, success stories etc. Through the individual implementation of regional strategies, European NUTS-2 regions tend to act like islands in terms of RIS3. To avoid such development, external (and internal) communication and networking activities are required. Therefore, a precise networking schedule with other trans-national observatories has to be developed and implemented by the communication body.

Furthermore, this body is the interlink to European level and responsible to exchange all necessary information, trends and results. Therefore, the cross-communication body should consist at least one representative from European level to ensure fast communication channels and communication managers from the regional level.

Thematic experts / stakeholder:

As mentioned earlier, the involvement of regional stakeholders is an important requirement to develop sophisticating strategies. This includes academics as well to foster regional development (Risár et. al., 2018). Though, the integration of thematic experts should be an on-going process in Smart Specialisation implementation. Therefore, the third body play a consulting role for the Managing Committee.

Another structural body to be included to the model is the management on national level. Analysing the case studies concludes only partly existence of national strategies. Therefore, this body is seen as optional and should focus on the support and coordination of all regions in the country.

For the model illustration in Figure 1, we assume a showcase having three regions from two different European countries (red and green frames). As mentioned, another assumption is a unification of priority axis which creates a defined set to choose from – illustrated by numbers. In this case, all three regions have chosen priority No. 11 as one of their smart specialisation axes as result on individual and regional analysis between several others. Thus, the regions are part of the cluster managed by the Transnational RIS3 observatory No. 11 with all mentioned characteristics and their representative for priority No. 11 will enter the Management Committee.
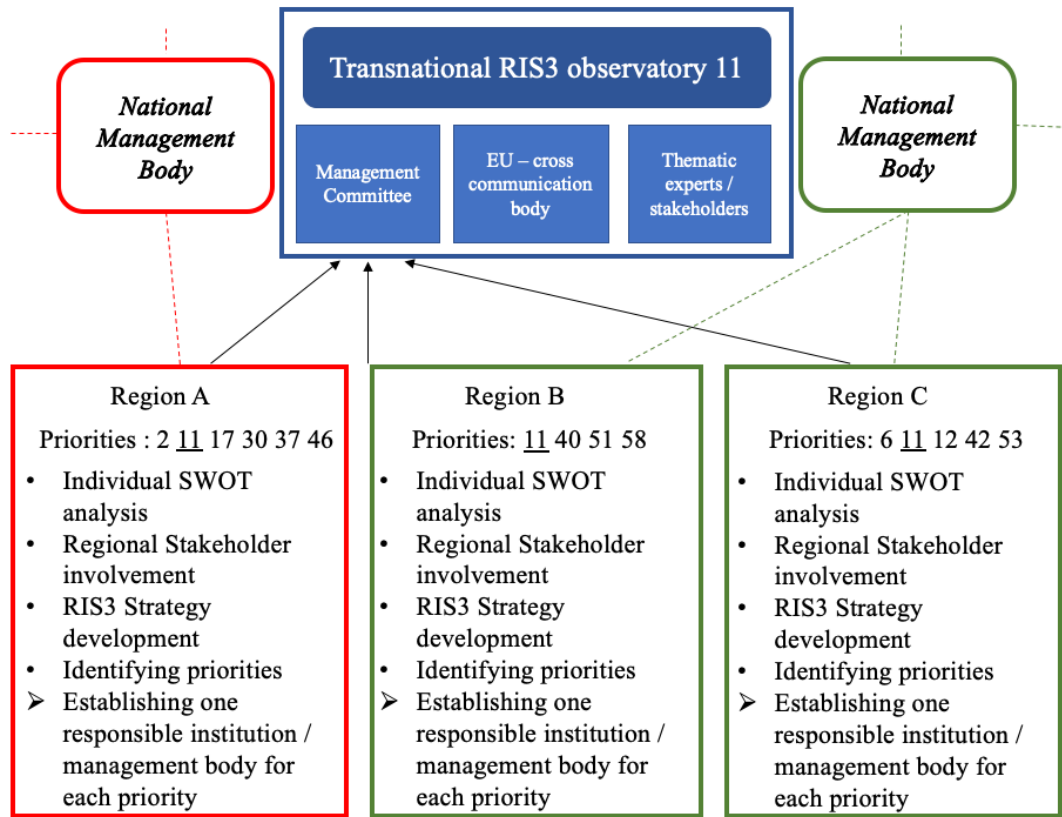
Figure 1: Transnational RIS3 Observatory Model including interlinks between structural bodies

Source: Compiled by the author

As shortly mentioned, the Transnational RIS3 observatories need to build up a network among each other via the communication body to connect all acting levels from regional to European. On European level, the responsible directorate need to be included to the overall Smart Specialisation implementation, namely European Commission, S3 platform and Joint Research Centre. Figure 2 illustrates possible connections between the actors, having three observatories as examples. This structure is necessary for regular information exchange as well as on-going monitoring on European level, including an evaluation of funding programmes and their results in terms of the RIS3 approach.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
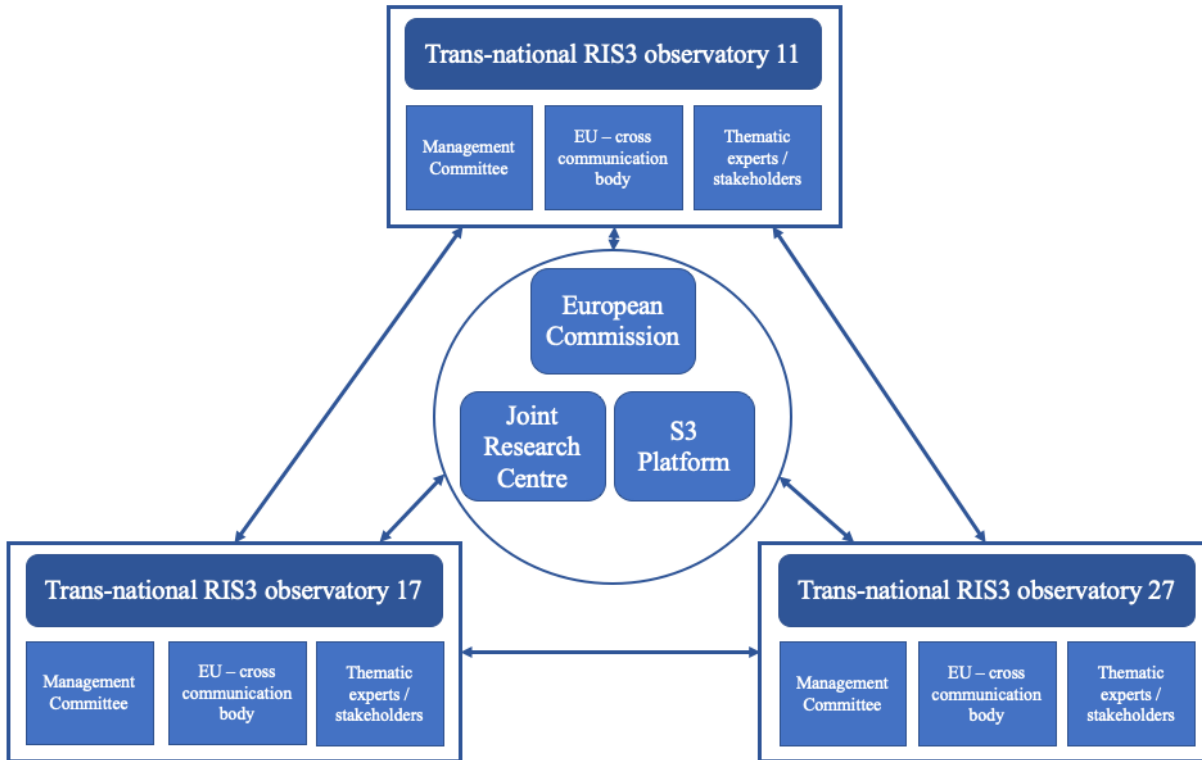

Figure 2: Classification and interlinks of Transnational RIS3 Observatories on European level

Source: Compiled by the author

To make sure a well-balanced number of regions within the observatories and avoid large-scale observatories, a geographical limitation could be implemented, also socio-economic characteristics could be reasonable allocation of the observatories (Pavone et. al., 2020). Another option is to implement classifications following the European funding areas, e.g. Central Europe or Baltic Sea Region. This ensures that the regions may have several similarities and their different circumstances are not too high obstacles for joint activities.

Monitoring System for the Trans-national RIS3 observatory

The proposed monitoring characteristics in the model is not part of the structure-oriented Figures 1 and 2. Following the earlier introduced approach to rely on cluster theories, the monitoring of a Trans-national RIS3 observatory itself should follow the Cluster policy cycle of the European Commission containing three stages: Analysis, Strategy and Action (European Commission, 2016a). This three-step approach is already implemented in several regional strategies and has been proven as sufficient process.

As key obstacle for a useful and sufficient monitoring system is the selection of indicators. In the case studies of the "SMART_watch" project, the author proposed a methodology to choose a set of indicators to measure Smart Specialisation performances of a limited number of NUTS-2 regions. In the presented model, the monitoring responsibilities are transferred completely to the Transnational RIS3 Observatory Model and its bodies. This allows a comprehensive comparison of the individual performances of the RIS3 implementation of each region under the observatories. As mentioned earlier, the national body is seen as optional unit so is the national

monitoring system. If countries decide to set up individual national monitoring system as well, the requirement to have a comparable system across all European regions would fade away, which is one of the main problems to overcome in the model, therefore, individual (national) monitoring systems are not recommended.

Besides the recommendation and assumption to unify the priority axis to choose from, a more unified approach in choosing the right indicators for Smart Specialisation performance measuring is the second key recommendation in line with the. Structural model. In the current implementation processes, each region chooses indicators by itself, which creates biased performance comparisons among regions. To avoid this bias, the selection of indicators should not be initiated on regional but on the European level in dialogue with the Transnational RIS3 observatories. In this sphere, indicators have to be distinguished with focus on Smart Specialisation performance measuring that serve as basis for all European regions monitoring – Set of Indicators for RIS3. This ensures high comparability among all regions and avoid biased individual monitoring activities. As the best practices have shown, at least context, output and result indicators have to be implemented in the set (European Commission, 2020).

As Figure 3 illustrates, the chosen set of indicators needs to be expanded by another category of indicators which are chosen specifically for the respective priority axis. As explained, the Transnational RIS3 observatories are set up in line with the thematic axis and though the observatories are in charge to select sufficient indicators to measure regional performances in the thematic fields – Priority specific indicators.
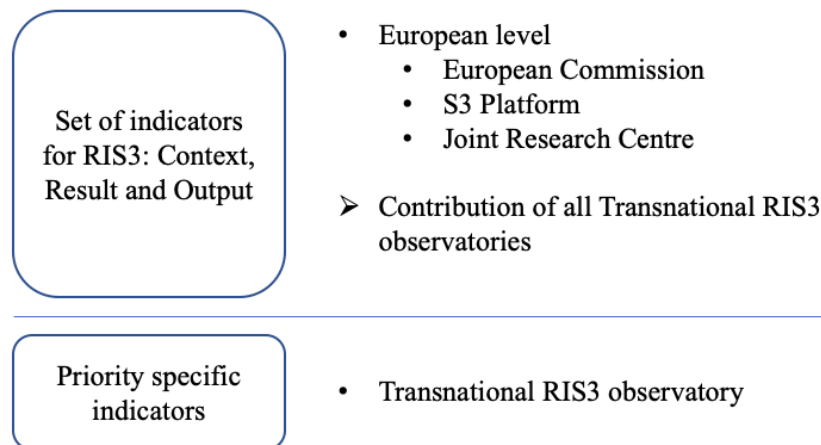

Figure 3: Monitoring indicators and responsibilities

Source: Compiled by the author

To finalise the set-up of proposed monitoring system in line with the Transnational RIS3 Observatory Model the regional capabilities need to be considered. At this point, the model considers the heterogeneity of European NUTS-2 regions. For each indicator of both categories, base values and target values have to be defined according to the region's economic, innovative and competitive circumstances and potentials. In line with this set-up, the data sources of indicator values have to be clarified to avoid any missing data in the on-going implementation and monitoring processes.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

5. Conclusions

The objective of this research paper was to examine, how a functional model can be implemented across the EU on all necessary levels to enable Smart Specialisation monitoring for RIS3 implementation. The conducted Transnational RIS3 Observatory Model as a tool introduces a sufficient structure that needs to be implemented and integrates main actors on regional, national and European level. Case study analyses were used building upon 10 European NUTS-2 regions' cases. In addition, the research delivers a macro-region and transferable concept of RIS3 policy governance that sets up the model structure as well as provides a portfolio of opportunities to foster collaboration across Europe on Smart Specialisation implementation, its evaluation and monitoring. The involvement of actors from the European level was introduced in line with the existing network participation in all Transnational RIS3 observatories interacting between each other and representatives of the European Commission, the Joint Research Centre and the S3 Platform as main contact points for Smart Specialisation.

Besides the structural description, the characteristics of the set of indicators as a key factor driving monitoring were described in detail including the responsible bodies for setting up and monitoring. At this point, the model pays tribute to the heterogeneity in terms of RIS3 monitoring discourse of European regions by providing room of action for individual optimisation. In addition, the model postulates the institutional responsibility for setting up regional target values for each indicator of the two categories: Set of Indicators for RIS3 and Priority specific indicators. As a result, this ensures a better evaluation of Smart Specialisation implementation success and a more efficient usage of regional capabilities.

The proposed model can be implemented initially in the current Smart Specialisation process supported by the online tool as proposed by Panori et. al. (2017). Required bodies and institutions are mainly established already across the regions. Therefore, a change to the proposed model can pushed fast and with low costs. It requires only resources regarding capacity reallocation and perspective change. Though, as next step, a feasibility study of the model with several NUTS-2 regions participating is recommended to test the structure and monitoring system to foster the regional RIS3 implementation performances.

References

Acevedo, C. (2019). Smart Specialisation Strategy: Analysis variables and dimensions. Preprint version.

Adeleke Abayomi, I., Fakinle Bamidele, S., Odunlami Olayemi, A., & Sonibare Jacob, A. (2020). Spatial biomonitoring of airborne heavy metals emitted from a steel recycling plant. *Management of Environmental Quality: An International Journal*, 31(3), 548-563. https://www.emerald.com/insight/content/doi/10.1108/MEQ-07-2019-0164/full/html

Andersons, A. & Bushati, J. (2019). Smart Specialisation Concept Application in Universities: E-Business Online Studies Model Development, In: Proceedings of the 12th International Scientific and Practical Conference, 2, 190-194, Rezekne, Latvia.

Angelidou, M., Komninos, N., Passas, I., Psaltoglou, A. & Tsarchopoulos, P. (2017). MONITORING THE IMPACT OF SMART SPECIALISATION STRATEGIES ACROSS EU REGIONS. Proceedings of International Conference for Entrepreneurship, Innovation and Regional Development Conference, pp. 343-353, Thessaloniki, Greece.

Björk, P. & Johansson, C. (2017). Knowledge for innovations – resources for smart specialisation. Final Report. Hanken School of Economics, from http://www.osterbotten.fi/assets/1/Regionalutvecklingsenheten/smart-spec/KNOWLEDGE-FOR-INNOVATIONS-slutrapport-2017-PB-CJ.pdf

Capello, R. & Kroll, H. (2016). From theory to practice in smart specialization strategy: emerging limits and possible future trajectories, *European Planning Studies*, 24 (8), 1393-1406. https://doi.org/10.1080/09654313.2016.1156058

Charmaz, K. (2014). Constructing Grounded Theory, SAGE Publications, 2nd edition, London, Great Britain.

Christensen, T.A., Lämmer-Gamp, T. & Meier zu Köcker, G. (2012). Let's make a perfect cluster policy and cluster programme. Smart recommendations for policy maker. ESCA, Berlin.

Cismas, L.M., Miculescu, A., Negrut, L., Negrut, V., Otil, M.D., & Vadasan, I. (2019). Social Capital, Social Responsibility, Economic Behavior and Sustainable Economic Development – An Analysis of Romania's Situation. *Transformations in Business & Economics*, 18(No 2A (47A)), 605-627.

Creswell, J.W. (2013). Qualitative Inquiry and Research Design – Choosing Among Five Approaches, SAGE Publications, 3rd edition, pp. 15-41, Thousand Oaks, California, USA.

Creswell, J.W. (2014). Research Design; Qualitative, Quantitative and Mixed Methods Approaches, SAGE Publications, 4th edition, Thousand Oaks, California, USA.

D'Adda, D., Iacobucci, D. & Palloni, R. (2019). Relatedness in the implementation of Smart Specialisation Strategy: a first empirical assessment, *Papers in Regional Science*, 99(3), 405-425. https://doi.org/10.1111/pirs.12492

Dagilienė, L., Bruneckienė, J., Jucevičius, R. & Lukauskas, M. (2020). Exploring smart economic development and competitiveness in Central and Eastern European countries. *Competitiveness Review*, 30(5), 485-505. https://doi.org/10.1108/CR-04-2019-0041

Elenkov, D.S., Judge, W. & Wright, P. (2005). Strategic Leadership and Executive Innovation influence: An international multi-cluster comparative study. *Strategic Management Journal*, 2, 665-682. https://doi.org/10.1002/smj.469

European Commission (2016a). Smart Guide to Cluster Policy: How to support SME Policy from Structural Funds. Guidebook Series.11th edition. Belgium, Retrieved August 24, from https://ec.europa.eu/growth/content/smart-guide-cluster-policy-published-0_en

European Commission: Implementing Smart Specialisation Strategies (2016b). A Handbook. Publications Office of the European Union, Luxembourg. Retrieved September 14, 2020, from https://s3platform.jrc.ec.europa.eu/documents/20182/154972/Implementing+Smart+Specialisation+Strategies+A+Handbook/2a0c4f81-3d67-4ef7-97e1-dcbad00e1cc9

European Commission (2019), The European Green Deal, Communication from the Commission, December 11, 2019, from https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1588580774040&uri=CELEX:52019DC0640

European Commission (2020). Monitoring, Retrieved August 24, 2020, from https://s3platform.jrc.ec.europa.eu/monitoring1

El Idrissi, N. E. A., Ilham Zerrouk, I., Zirari, N., & Monni, S. (2020). Comparative study between two innovative clusters in Morocco and Italy. *Insights into Regional Development*, 2(1), 400 - 417. http://doi.org/10.9770/IRD.2020.2.1(1)

Foray, D., Goddard, J., Beldarrain, X.G., Landabaso, M., McCann, P., Morgan, K., Nauwelaers, C. & Ortega-Argilés, R. (2012). Guide to Research and Innovation Strategies for Smart Specialisation. Smart Specialisation Platform. European Commission, Retrieved September 16, 2020, from https://ec.europa.eu/regional_policy/sources/docgener/presenta/smart_specialisation/smart_ris3_2012.pdf

Fuster Marti, E., Marinell, E., Plaud, S., Quinquilla, A. & Massucci, F. (2020). Open Data, Open Science & Open Innovation for Smart Specialisation monitoring. JRC Working Papers JRC119687, Joint Research Centre.

Gagnidze, I. (2015). Cluster as a tool for Challenges of Development, In: STRATEGICA, International Academic Conference – Third Edition – Local versus Global, October 29-31, Bucharest, Romania.

Gerlitz, L. (2016). Design Management as Domain of Smart and Sustainable Enterprise: Business Modelling for Innovation and Smart Growth in Industry 4.0. *The International Journal of Entrepreneurship and Sustainability Issues*, 3(3), 244-268. http://dx.doi.org/10.9770/jesi.2016.3.3(3)

Georghiou, L., Uyarra, E., Scerri, R.S., Castillo, N. and Harper, J.C. (2014). Adapting Smart Specialisation to a Micro-Economy – the Case of Malta. European Journal of Innovation Management, 17(4), 428-447. http://dx.doi.org/10.1108/EJIM-03-2014-0026

Gianelle, C. & Kleibrink, A. (2015). Monitoring Mechanisms for Smart Specialisation Strategies. S3 Policy Brief Series No. 13/2015.

Gianelle, C., Guzzo, F., & Mieszkowski, K. (2019). Smart Specialisation: What gets lost in translation from concept to practice? *Regional Studies*, 54(10), 1377-1388. https://doi.org/10.1080/00343404.2019.1607970

Gianelle, C., Kyriakou, D., McCann, P. & Morgan, K. (2020). Smart Specialisation on the move: reflections on six years of implementation and prospects for the future, *Regional Studies*, 54(10), 1323-1327. https://doi.org/10.1080/00343404.2020.1817364

Grillitsch, M. (2016). Institutions, smart specialisation dynamics and policy. *Environment and Planning C: Government and Policy*, 34(1), 22 – 37. https://doi.org/10.1177/0263774X15614694

Gulc, A. (2015). Analysis of Methodological Approach to Identify Smart *Specialization on the Example of Polish Regions, Procedia – Social and Behavioural Sciences,* 213, 817-823. https://doi.org/10.1016/j.sbspro.2015.11.483

Huang, H.B. (2010). What is good action research? Why the resurgent interest? *Action Research*, 8(1), 93-109. https://doi.org/10.1177/1476750310362435

Janger, J., Schubert, T., Andries, P., Rammer, C. & Hoskens, M. (2017). The EU 2020 innovation indicator: A step forward measuring innovation outputs and outcomes?, *Research policy*, 46(1), 30-42. http://dx.doi.org/10.1016/j.respol.2016.10.001

Jasinska, K. & Jasinski, B. (2019). Clustres under Industry 4.0 Conditions – Case Study: The Concept of Industry 4.0 Cluster in Poland. *Transformations in Business & Economics*, 18, (2B (47B)), 802-823.

Keller, T. (1996). Concept of Holding – Organizational Structure and Management. Higher Education and Science. Obninsk.

Ketels, C. & Protsiv, S. (2016). European Cluster Panorama 2016. European Cluster Observatory Report. European Commission. Retrieved August 24, 2020, from http://ec.europa.eu/DocsRoom/documents/20381

Kogut-Jaworska, M. & Ociepa-Kicinska, E. (2020). Smart Specialisation as a Strategy for Implementing the Regional Innovation Development Policy – Poland Case Study, S*ustainability*, 12, 7896. https://doi.org/10.3390/su12197986

Komninos, N., Musyck, B. & Reid, A.I. (2014). Smart specialisation strategies in South Europe during crisis. *European Journal of Innovation Management*, 17(4), 448-471. https://doi.org/10.1108/EJIM-11-2013-0118

Kroll, H., Böke, I., Schiller, D. and Stahlecker, T. (2016). Bringing Owls to Athens? The Transformative Potential of RIS3 for Innovation Policy in Germany's Federal States. *European Planning Studies*, 24(8), 1459-1477. https://doi.org/10.1080/09654313.2016.1159666

Landabaso, M. (2014). Guest editorial on research and innovation strategies for smart specialisation in Europe. *European Journal of Innovation and Management*. 17(4), 378-389. https://doi.org/10.1108/EJIM-08-2014-0093

Marques P. & Morgan K. (2018). The Heroic Assumptions of Smart Specialisation: A Sympathetic Critique of Regional Innovation Policy. In: Isaksen A., Martin R., Trippl M. (eds) New Avenues for Regional Innovation Systems - Theoretical Advances, Empirical Cases and Policy Lessons (pp. 275 – 293). Springer, Cham. https://doi.org/10.1007/978-3-319-71661-9_14

Masana, R.E. & Fernández, T. (2019). Monitoring S3. *Key dimensions and implications. Evaluation and Program Planning,* Vol. 77. https://doi.org/10.1016/j.evalprogplan.2019.101720

McCann, P. & Ortega-Argilés, R. (2011). Smart Specialisation, Regional Growth and Applications to EU Cohesion Policy. Economic Geography Working Paper 2011: Faculty of Spatial Sciences, University of Groningen.

McCann, P. & Ortega-Argilés, R (2014). Smart specialisation in European regions: issues of strategy, institutions and implementation. *European Journal of Innovation and Management*. 17 (4), 409-427. https://doi.org/10.1108/EJIM-05-2014-0052

Mora, L., Deakin, M. & Reid, A. (2019). Exploring Current Trends in Scientific Research on Smart Specialisation. *Scienze Regionali: Italian Journal of Regional Science*. 18(3), 397-422. https://doi.org/10.14650/94657

Morgan, K. (2017). Nuturing novelty: Regional innovation policy in the age of smart specialisation, *Environment and Planning C: Politics and Spac*e, 35(4), 569-583. https://doi.org/10.1177/0263774X16645106

Navarro, M., Gibaja, J.J., Franco, S., Murciego, A., Gianelle, C., Hegyi, F.B. & Kleibrink, A. (2014). Regional benchmarking in the smart specialisation process: Identification of reference regions based on structural similarity, S3 Working Paper Series, No. 03/2014, Retrieved August 24, 2020, from: https://s3platform.jrc.ec.europa.eu/-/regional-benchmarking-in-the-smart-specialisation-process-identification-ofreference-regions-based-on-structural-similarity

Panori, A., Komninos, N., Kakderi, C and Fellnhofer, K. (2017). Smart Specialisation Strategies: An online platform for strategy design and assessment. RelStat 2017. Springer Lecture Notes in Networks and Systems.

Pavone, P., Pagliacci, F., Russo, M., Righi, S. & Giorgi, A. (2020). Multidimensional Clustering of EU Regions: A Contribution to Orient Public Policies in Reducing Regional Disparities. Social Indicators Research. Springer Verlag. https://doi.org/10.1007/s11205-020-023249

Porter, M.E. (1998). Clusters and the New Economics of Competition. Harvard Business Review. 76, 77-90.

Portney, K. (2004). The legal status of Holdings in Russia: Scientific and Practical Guide. Moscow: Wolters Kluwer.

Roman, M., Nyberg, T., & Fellnhofer, K. (2018). SMART SPECIALISATION IN FINNISH REGIONS: HOW TO FACILITATE CONTINUOUS ENTREPRENEURIAL DISCOVERY PROCESS? In: B. Nunes, A. Emrouznejad, D. Bennett, & L. Pretorius (Eds.), Towards Sustainable Technologies and Innovation: 27th Annual Conference of the International Association for Management of Technology, pp. 1-16, Aston University.

Rane Santosh, B., & Thakker Shivangi, V. (2019). Green procurement process model based on blockchain–IoT integrated architecture for a sustainable business. *Management of Environmental Quality: An International Journal*, 31(3), 741-763. https://www.emerald.com/insight/content/doi/10.1108/MEQ-06-2019-0136/full/html

Risár, P., Hunady, J. & Durcekova, I. (2018). Role of Research and Development in Smart Specialisation of EU regions and its Effect on Labour Productivity, International Scientific Conference – Hradec Economic Days. http://doi.org/10.36689/uhk/hed/2018-02-015

Ruhrmann, H., Fritsch, M. & Leydesdorff, L. (2020). Smart Specialization Strategies at National, Regional, or Local Levels? Synergy and Policy-making in German Systems of Innovation. Jena Economic Research Papers, 2020-007.

Rusu, M. (2013). Smart Specialiszation a Possible Solution to the New Global Challenges, Procedia Economics and Finance, 6, 128-136. https://doi.org/10.1016/S2212-5671(13)00124-X

Sandu, S. (2012). Smart Specialization Concept and the Status of Its Implementation in Romania, Procedia Economics and Finance, 3, 236-242. https://doi.org/10.1016/S2212-5671(12)00146-3

Saunders, M., Lewis, P., Thornhill, A. (2009). Research Onion – Research methods for business students, pp. 136-162.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Short biographical note about the contributors at the end of the article (name, surname, academic title and scientific degree, duties, research interests):

Christopher MEYER, PhD Candidate coordinates several European research projects at the European Project Center associated to the University of Wismar. After his master degree in public economics, he started his studies as PhD Candidate at TalTech University in Tallinn, Estonia, elaborating the impact of Smart Specialisation on the Blue Economy of the Baltic Sea Area.
ORCID ID: orcid.org/0000-0002-6048-1198

Register for an ORCID ID:
https://orcid.org/register

DETERMINANTS OF TAX COMPLIANCE:
A STUDY ON INDIVIDUAL TAXPAYERS IN INDONESIA

Musthafa Kemal Nasution [1], Fitri Santi [2], Husaini [3], Fadli [4], Kashan Pirzada [5]

[1234]Faculty of Economics and Business, University of Bengkulu, Jl. WR. Supratman, Bengkulu 38371 Indonesia
[5]Asian Research Institute for Corporate Governance (AIRCG) and Tunku Puteri Intan Safinaz School of Accountancy,
College of Business, Universiti Utara Malaysia, Sintok, Malaysia

E-mails: [1] kemnas73@gmail.com; [2] fitri_santi@unib.ac.id; [3] husaini@unib.ac.id; [4] fadli_abdullah@yahoo.com;
[5] kashan@uum.edu.my

Abstract. This study aims to analyze the effect of tax knowledge, tax complexity, and tax justice on taxpayers' trust and tax compliance as well as the differences in tax compliance levels in South Sumatra. The research is explanatory and takes a quantitative approach. The method of data collection used a questionnaire containing the variables and documentation outlined by the study. The research questions were tested using hypothetical compliance scenarios, with 900 registered individual taxpayers from five major cities in South Sumatra as participants. The researchers used confirmatory factor analysis (CFA) with the structural equation modeling (SEM) approach. Results of the research show that (1) tax knowledge has no effect on taxpayers' trust, (2) tax complexity has no effect on taxpayers' trust, (3) tax justice has an effect on taxpayers' trust, (4) tax knowledge has no effect on tax compliance, (5) tax complexity has no effect on tax compliance, (6) tax justice has an effect on tax compliance, (7) taxpayers' trust has an effect on tax compliance, and (8) there were differences in the level of tax compliance after the implementation of the SMS blast program.

1. Introduction

The low level of tax compliance in Indonesia is as crucial as it is in other countries. According to OECD (2017), the Indonesian tax ratio reached 11.8% in 2015. This is lower than other Southeast Asian countries, such as Malaysia (15.3%), Singapore (13.6%) and the Philippines (17%). This is further explained by Araki and Claus (2014), who classified Indonesia into group of other countries with low levels of tax compliance, such as Cambodia and India. This is significant because Indonesia had the 16th highest gross domestic product (GDP) in 2019 (World Bank, 2019) and is one of the six non-OECD countries with largest economies, along with Brazil,

Russia, India, China, and South Africa (BRICS) (OECD, 2008). To increase the tax ratio and the nation's income, the Indonesian government must improve tax compliance by exploring the determinants of individual taxpayers' compliance. Chau and Leung (2009) state that "tax compliance is growing international concerns for tax authorities and public policy makers as tax evasion seriously threatens the capacity of government to raise public revenue" (p. 34). Tax compliance is also a main topic in economic psychology. This issue has been analyzed from different perspectives that focus on several aspects of taxpayer behavior. Attitude is measured, social norms are applied, and common theories are explored when people declare their annual tax return (Kirchler, 2007). In Indonesia's case, the number of individual taxpayers dominates all registered taxpayers, at around 90% of the total. However, their share in terms of tax contribution is still low.

Previous studies have tried to explain the arguments concerning factors that influence tax compliance, but it is unclear whether these studies contribute to the tax system in developing countries because, in some developing countries, local authorities tend to have less power and public trust due to political, social, and economic instability, leading to low tax compliance. On the contrary, some developed countries have demonstrated stronger tax regulation and higher trust, which generate high tax compliance (Bird, Martinez-Vazquez, and Torgler, 2008). The present research names tax compliance as the second endogenous latent variable and applies the theory of planned behavior (TPB) (Ajzen, 1991) to its hypothesis. This research also uses a combination of concepts revealed by Bărbuţă-Mişu (2011) and Alm (2018), who divided factors influencing tax compliance into two groups, namely, economic and noneconomic. This study utilizes several applied theories based on the review of the related literature to analyze the other identified variables: (1) the first endogenous latent variable (taxpayers' trust) and (2) the exogenous latent variables (tax knowledge, tax complexity, and tax justice). This study aims to analyze the effect of tax knowledge, tax complexity, and tax justice on taxpayers' trust and tax compliance as well as the differences in tax-compliance levels in South Sumatra. The researchers selected this region because no tax compliance–related studies have examined it and the rate of individual taxpayers' compliance is still low. Additionally, it may become the benchmark for other regions in Indonesia to increase their tax compliance.

The novelty of this research is the categorization of registered individual taxpayers into two groups: (1) compliant taxpayers (CT) who regularly pay taxes and file an annual tax return and (2) noncompliant taxpayers (NCT). CT consists of paying-filing taxpayers (PFT). NCT is divided into three subgroups: paying-nonfiling taxpayers (PNFT), filing-nonpaying taxpayers (FNPT), and nonpaying-nonfiling taxpayers (NPNFT). Furthermore, none of the previous studies has focused on the differences in tax-compliance levels among individual taxpayers categorized as noncompliant, before and after the implementation of a certain tax scheme. Hence, this study employs a short message service (SMS) blast to test individual taxpayers' compliance levels in South Sumatra. This study contributes to improving tax compliance in South Sumatra and expanding the Indonesian tax base because the focus is shifted from increased tax revenue to new tax revenue generated from NPNFT.

The rest of this paper is organized as follows: a survey of related literature and the development of hypotheses are provided in Section 2. Section 3 describes the research objective and methodology employed in this paper. The results and discussion are reported in Section 4, and Section 5 concludes the paper.

2. Literature review

2.1 Effect of tax knowledge on taxpayers' trust

Fahr and Djawadi (2013) explain that tax compliance is considered high in a tax system with low power of authority when complete transparency concerning public expenses is provided and when taxpayers are given options in utilizing the taxes they paid. Fahr and Djawadi (2013) further demonstrate that strong tax authority, reflected from high tax audits, does not guarantee the improvement of tax compliance, even when taxpayers' trust is increased. However, with adequate tax knowledge, taxpayers are more likely to trust the tax authorities, ultimately leading to tax compliance. Palil, Akir, and Ahmad (2013) found that tax compliance is lower among people with less tax education and knowledge. In other words, with proper tax knowledge, taxpayers will be able to decide whether they trust the tax authorities. This emergence of trust will eventually determine the taxpayer's decision to comply with tax obligation. Gitaru (2017) argues that electronic education of taxpayers, print media, taxpayers' education, and the stakeholders' engagement influence tax compliance among small–medium enterprises (SMEs) in Nairobi, Kenya. The sensitivity of stakeholders is positively related to taxpayers' education in calculating correct tax liabilities (Susanto, Pirzada, and Adrianne, 2019) Overall, education influences taxpayers' trust in the tax authorities. This will lead to taxpayers' willingness in paying their taxes voluntarily. Considering these studies, the first hypothesis predicts:

H1: Tax knowledge influences taxpayers' trust in South Sumatra.

2.2 Effect of tax complexity on taxpayers' trust

Forest and Sheffrin (2002) state that tax complexity influences taxpayers' trust on tax authorities. Budak and James (2018), who believe that complexity has a significant part in improving the costs of tax compliance, support Forest and Sheffrin's idea. Complexity particularly affects compliance related to complex legislation because complicated legislation makes it costly for taxpayers to comply with their obligations. Saad (2014) proves that tax complexity influences tax compliance. It is caused by the huge amount of paperwork to be completed by taxpayers in New Zealand in complying with their tax obligations. Gambo, Mas'ud, Nasidi, and Oyewole (2014), who investigated tax compliance in 44 African countries, suggest that tax complexity negatively affects taxpayers' trust toward tax authorities. Brainyyah and Rusydi (2016) conducted a study on SME entrepreneurs in Malang, East Java, and discovered that tax complexity has significant and negative correlations with tax compliance behavior. This study indicates that the more complex a tax regulation is, the more ignorant the taxpayers will be. Furthermore, Mahangila (2017), who studied 75 SME entrepreneurs in Dar es Salaam, Tanzania, suggests that tax complexity has an impact on taxpayers' trust toward tax authorities. Based on these studies, the second hypothesis is proposed:

H2: Tax complexity influences taxpayers' trust in South Sumatra.

2.3 Effect of tax justice on taxpayers' trust

Benk, Budak, and Cakmak (2012) identify six dimensions of tax fairness, namely, general fairness, tax share and tax burden of middle-income earners, exchange with the government, tax-rate structure, special provisions, and tax system equality and inequality. Benk, Budak, and Cakmak, (2012) further conclude that tax fairness has an impact on taxpayers' trust in Turkey. Gberegbe, Idornigie, and Nkanbia-Davis (2015) explain that taxpayers' perceptions toward tax justice applied by tax authorities affects taxpayers' trust. Faizal and Palil (2015), who

studied individual taxpayers in Malaysia, reveal that tax fairness perception influences individual taxpayers' trust. This illustrates that the more fairness is perceived by taxpayers, the higher the level of taxpayers' trust will be. Belay and Viswanadham (2016) researched several cities in Amhara Regional State, Ethiopia, and discovered that perceptions of tax fairness have an impact on individual taxpayers' trust. They further explain that there are concerns regarding several aspects of the country's income tax system that need to be improved. Based on the preceding discussions, the third hypothesis is formulated:

H3: Tax justice influences taxpayers' trust in South Sumatra.

2.4 Effect of tax knowledge on tax compliance

Newman and Nokhu (2018), who studied several SMEs in Zimbabwe, identified that these SMEs possess basic tax knowledge but no deeper understanding concerning the differences between presumptive taxation and income-based taxation. However, this result insignificantly affects their noncompliance, meaning tax knowledge influences tax compliance. Newman and Nokhu (2018) further explain that to positively impact tax compliance, tax tariff and corruption issues must be taken seriously. Bernard, Memba, and Oluoch (2018) conducted a study on investors in export processing zones (EPZs) in Kenya and advised that tax knowledge has a close relationship with taxpayers' ability to understand tax rules and regulations as well as their willingness to comply with them. A company with employees trained in taxation matters is likely to voluntarily fulfill their tax obligations based on applied tax rules and regulations. Due to these findings, the fourth hypothesis is as follows:

H4: Tax knowledge influences tax compliance in South Sumatra.

2.5 Effect of tax complexity on tax compliance

Krause (2000) proves that uncertainty, ignorance, and burdensome documentation requirements prevent some taxpayers from taking advantage of legitimate tax rebates and deductions, while others find opportunities to avoid taxes in such ambiguous provisions. Complexity has undermined the ability of Internal Revenue Service (IRS) ability to distinguish between intended tax avoidance and honest misinterpretation regarding tax codes and planning Rudyanto and Pirzada, 2020). McKerchar (2005), who surveyed tax agents in Australia, discovered that these agents disagree with the increased complexity of tax laws Richardson (2006), in his research of 45 countries, suggests that complexity is the main driver of noncompliance besides education, source of income, justice, and tax morale. His findings are consistent with that of Cox and Eger III (2006) who believe that complexity leads to misdirection of objectives of the tax agency an increased opportunity for noncompliance. Similarly, Kirchler, Niemirowski, and Wearing (2006) argue that the possibility of compliance is higher when tax laws are considered less complex. These thoughts lead to the fifth hypothesis:

H5: Tax complexity influences tax compliance in South Sumatra.

2.6 Effect of tax justice on tax compliance

Musthapha (2010) performed a study in Nigeria and believes that two out of five dimensions of tax justice, namely, exchange with government and special provisions, affect tax compliance. Similarly, Mukasa (2011) states that an increase in tax justice will lead to the improvement of tax compliance. Gberegbe and Umoren (2017) claim that distributive justice, procedural justice, retributive justice, and perceptions of tax justice affect individual taxpayers' compliance in Rivers State, Nigeria. Olaoye, Ayeni-Agbaje, and Alaran-Ajewole (2017) studied block

molding firms in Ekiti Province, Nigeria, and point out that tax knowledge has a higher tendency to promote tax compliance than tax administration. Furthermore, Sidik, Zandi, and Ruhoma (2019), who researched individual taxpayers in Libya, state that tax justice influences tax compliance. They believe that public perception of fairness depends on how they perceive tax system to be fair or not. These findings lead to the next hypothesis:

H6: Tax justice influences tax compliance in South Sumatra.

2.7 Effect of taxpayers' trust on tax compliance

Wahl, Kastlunger, and Kirchler (2010) discovered that power and trust have a positive impact on tax payment. Dependable and reliable tax authorities could increase tax compliance voluntarily or by law enforcement. Kogler et al. (2013) and Muehlbacher, Kirchler, and Schwarzenberger (2011) revealed similar findings, suggesting that trust in tax authorities increases voluntary tax compliance. Additionally, Bornman (2015) proposes that perceptions of fairness, treatment of authorities, norms and attitudes, and subjective tax knowledge are the main factors determining trust in tax authorities. However, several studies use limited descriptors when measuring this relationship. Bornman (2015) further suggests that standard survey instrument need to be developed to measure this perception. Based on these studies, the seventh hypothesis is proposed:

H7: Taxpayers' trust influences tax compliance in South Sumatra.

2.8 Differences in taxpayers' compliance levels

Najah (2008) and Husaini, Pirzada, and Saiful (2020) argues that there is no difference in corporate taxpayers' compliance levels before and after the enactment of a tax audit. Komalasari and Nasih (2010) tested the influence of taxpayers' reported income toward the level of their compliance and found that there was no significant difference in the level of taxpayer compliance whether a 15% or 30% tax tariff was imposed. Fajarwati, Kertahadi, and Kurniawan (2004) conducted a study in several tax offices in Malang Raya, East Java and found that there was a significant difference between the degrees of tax compliance before and after the implementation of a tax modernization program. These studies explain the differences in taxpayers' compliance levels before and after the implementation of tax-related schemes. Accordingly, this study applies a tax program called an SMS blast to test the compliance levels in South Sumatra. This leads to the eighth hypothesis:

H8: There will be differences in taxpayers' compliance levels before and after the implementation of the SMS blast program.

3. Research objective and methodology

3.1 Design, variables, measurements, and sources

This research is explanatory with a quantitative approach. Three main objectives were achieved through this study. The first objective is a description of taxpayers' trust as the first endogenous latent variable (Y1); tax compliance as the second endogenous latent variable (Y2); and tax knowledge (X1), tax complexity (X2), and tax justice (X3) as exogenous latent variables (X). The second is the effect of the exogenous latent variables on Y1 and Y2 and the influence of Y1 on Y2. The third objective is to identify the differences in tax compliance among individual taxpayers who fall into the noncompliant category consisting of PNFTs, NPFTs, and NPNFTs.

3.2 Population, sample, data collection, and method of analysis

The population of this study includes all individual income taxpayers registered in tax offices in the five provinces of South Sumatra, including Jambi, South Sumatra, Bengkulu, Lampung, and the Bangka Belitung Islands (see Table 1). The study used representative sampling to reflect the characteristics of the larger population. Research questions were tested using hypothetical compliance scenarios with 900 registered individual taxpayers from five major cities in South Sumatra as participants. The determination of the sampling method was based on the idea that "the number of samples in the SEM study was 5–10 times the number of indicators" (Hair et al., 2014, p. 615). In this study, the multiplier factor of 10 is used to provide a more detailed and accurate picture of the five variables studied. With a total of 78 indicators, the total sample was 780 people. The sample size was increased to 900 people to anticipate insufficient or incomplete data. In practice, out of five tax offices, 180 samples of individual taxpayers were determined in each province and divided into two groups, consisting of 90 employees and 90 nonemployees. The characteristics of the respondents include gender, age, education, type of employment, and duration as taxpayer (see Table 2).

Table 1. Research Population

No.	Provinces	Registered Individual Taxpayers		Subtotal
		Employees	Nonemployees	
1	Jambi	33,286	17,823	51,109
2	South Sumatra	58,976	29,632	88,608
3	Bengkulu	31,717	15,898	47,615
4	Lampung	52,294	27,118	79,412
5	Bangka Belitung Islands	13,265	7,096	20,361
	Total	189,538	97,567	287,105

Source: Indonesian Directorate General of Taxes (2018)

Table 2. Characteristics of Research Respondents

Characteristics	Items	Number of respondents	Percentage (%)
Gender	Male	547	70.13
	Female	233	29.87
Age	17–25 years	3	1.18
	26–35 years	72	28.23
	36–45 years	40	15.67
	46–55 years	140	54.90
Education	High school graduate	78	10.00
	Tertiary education (Grade 1–3)	141	18.08
	Bachelor' degree	492	63.08
	Master's degree	53	6.79
	Doctoral degree	16	2.05

Type of employment	Employee a. Civil servant	195	25.00
	b. Private	195	25.00
	Nonemployee	390	50.00
Duration as taxpayer	1–5 years	139	15.29
	5–10 years	434	52.55
	> 10 years	207	32.16

Registered taxpayers in South Sumatra are dominated by men (70.13%), age 46–55 (54.90%) with undergraduate qualifications (63.08%).

Data collection used a questionnaire containing the latent variables and documentation. The data was then processed using a Likert scale. of the data was analyzed using a quantitative approach to test the effect of the exogenous latent variables (X1, X2, X3) on the first endogenous latent variable (Y1) and the second endogenous latent variable (Y2) and to test the effect of Y1 on Y2. The quantitative analysis also examines the differences in compliance levels of noncompliant taxpayers (NCT), who are divided into three subgroups: paying-nonfiling taxpayers (PNFT), filing-nonpaying taxpayers (FNPT), and nonpaying-nonfiling taxpayers (NPNFT). The analysis method uses confirmatory factor analysis (CFA) with the structural equation modeling (SEM) approach. A statistical program called a linear structural relationship (LISREL) was applied to estimate SEM. Other statistical tools included statistical package for the social sciences (SPSS) to perform descriptive statistics, a validity test, a reliability test, and a Z-test. Based on the analyses of previous studies related to tax compliance, trust, tax knowledge, tax complexity, and tax justice, a research framework as seen in Figure 1 was developed.
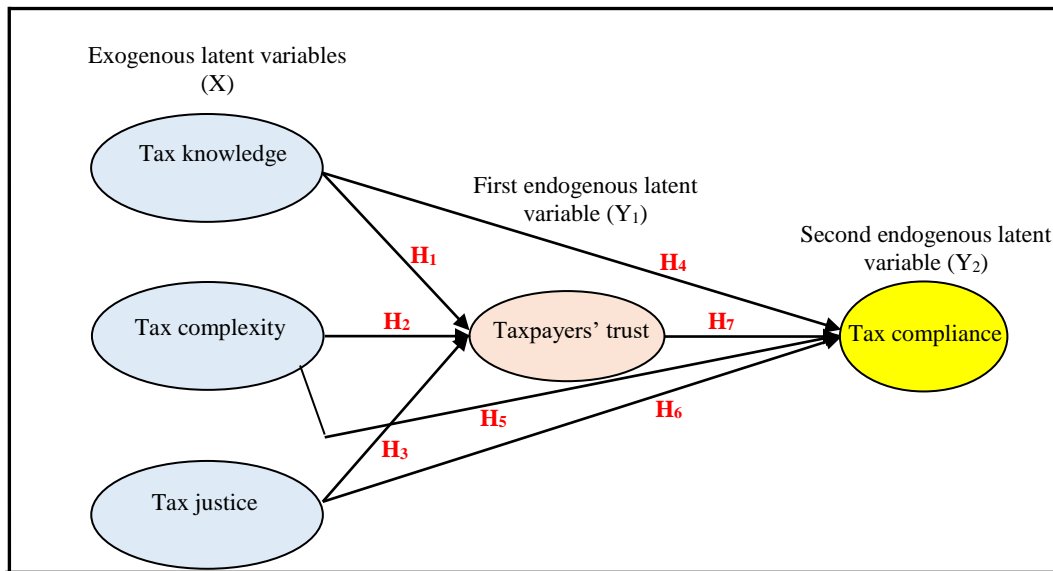
Figure 1. Conceptual Framework

Sources: Tax compliance: Alm (2018); Bărbuţă-Mişu (2011); Taxpayers' trust: Bornman (2015); Tax knowledge: Asrinanda & Diantimala (2018); Istiqamah et al. (2018); Saad (2014); Tax complexity: AICPA (1992); Cox & Eger III (2006); McCaffery (1990); Pau et al. (2007); Richardson & Sawyer (1998); Saw & Sawyer (2010); Tax justice: Colquitt (2001); Farrar et al. (2013); Gberegbe et al. (2015); Kirchler et al. (2014)

3.3 Validity and reliability test

The validity test is a measure of the accuracy of the instruments used in the study (Linn and Grondlund, 2000; Stewart, 2009), while a reliability test shows the number of measurement errors in a test (Tavakol and Dennick, 2011, p. 53). Reliability and validity are concepts used to evaluate the quality of research. They indicate how well a method, technique, or test measure something. This study employs these two tests to measure the accuracy and consistency of questionnaire items in explaining indicators of each research variable. Hair, Black, Babin and Anderson (2010) suggest that an item is considered valid if it has a factor loading value > 0.6, while Nunnally and Bernstein (1994) point out that data is reliable if Cronbach's alpha value is > 0.7. The test results are shown in Table 3.

Table 3. Results of Validity and Reliability Test

No.	Research variables	AVE value	Result	Cronbach's alpha	Result
1	Tax compliance	0.76	Valid	0.793	Reliable
2	Taxpayers' trust	0.73	Valid	0.746	Reliable
3	Tax knowledge	0.76	Valid	0.711	Reliable
4	Tax complexity	0.74	Valid	0.737	Reliable
5	Tax justice	0.73	Valid	0.752	Reliable

Research variables with a value of AVE > 0.6 indicate there is sufficient convergence for each variable. Cronbach's alpha value is greater than 0.7, meaning all five variables are reliable for further processing.

4. Results and discussion

4.1 Descriptive statistics

Table 4 shows that the number of respondents is 780 people and tax compliance had an average value of 298.32 (the lowest value). This indicates that, compared to other variables, tax compliance has the lowest preference among respondents. Taxpayers' trust had an average value of 309.71. Tax knowledge had an average value of 339.50. Tax complexity had an average value of 343.46, and tax justice had an average value of 344.29 (the highest value).

Table 4. Descriptive Statistics Results

No.	Research variables	n	Maximum	Minimum	Mean
1	Tax compliance	780	615	19	298.32
2	Taxpayers' trust	780	627	9	309.71
3	Tax knowledge	780	688	9	339.50
4	Tax complexity	780	689	3	343.46
5	Tax justice	780	694	6	344.29

The amount of data to be studied is 780 samples. The tax compliance variable has a mean value of 298.32, meaning an average of 298 individual taxpayers in South Sumatra show preference for tax compliance.

4.2 Confirmatory factor analysis

This study utilizes confirmatory factor analysis (CFA) with the SEM approach to analyze the effect of the exogenous latent variables on Y1 and Y2 and the influence of Y1 on Y2. The analysis tool uses a computer-based application program, namely, a linear structural relationship (LISREL). The stages of CFA are as follows (Hair et al., 2010, p. 628):

4.2.1 Development of theory-based model

The research model was based on the theory of planned behavior (TPB) (Ajzen, 1991) and a combination of concepts by Bărbuţă-Mişu (2011) and Alm (2018), who place factors influencing tax compliance into two groups, namely, economic and noneconomic. TPB suggests that a person's motivation to perform a certain behavior is also influenced by the individual's perception of how easy or difficult the behavior is. This justifies the need to expand the model to understand other factors that influence tax compliance. This theory-based model consists of five variables, including taxpayers' trust as the first endogenous latent variable (Y1), tax compliance as the second endogenous latent variable (Y2), and tax knowledge, tax complexity and tax justice as exogenous latent variables (X1–X3). The model developed in this study is illustrated in Figure 1.

4.2.2 Path diagram development

The path diagram aims to predict the causal relationship between predetermined variables and tests the contribution of each exogenous latent variable to Y1 and Y2 and the contribution of Y1 to Y2 (the test result is not presented in this paper).

4.2.3 Conversion of path diagram into equations

The next step after the theoretical model is developed and depicted in a path diagram is to convert the model into a series of equations, which include:

- A structural equation, which aims to determine the causal relationship between various variables. This study produces a structural equation as follows:
  Tax Compliance (TCO) = Taxpayers' Trust (TPT) + Tax Knowledge (TK)+ Tax Complexity (TC) + Tax Justice (TJ) + error
- The measurement model equation, which only involves the indicators of the variable gauges. The measurement model uses the equation $x = \lambda\xi + e$

4.2.4 Selection of input matrix and estimation technique

The input matrix is used to test the causality between variables. The input matrix used in this study is the covariance matrix. The estimation technique is the maximum likelihood estimation method (Hair et al., 2010, p. 631). This technique is carried out in stages by estimating the measurement model with CFA, which aims to determine the suitability of the model and the causality relationship that is built. CFA analysis in this study is carried out in two forms, namely, CFA for exogenous latent variables and for endogenous latent variables. The test results of the exogenous latent variables confirmatory factor model are shown in Table 5.

Table 5. Exogenous Latent Variables Confirmatory Factor Model Test Results

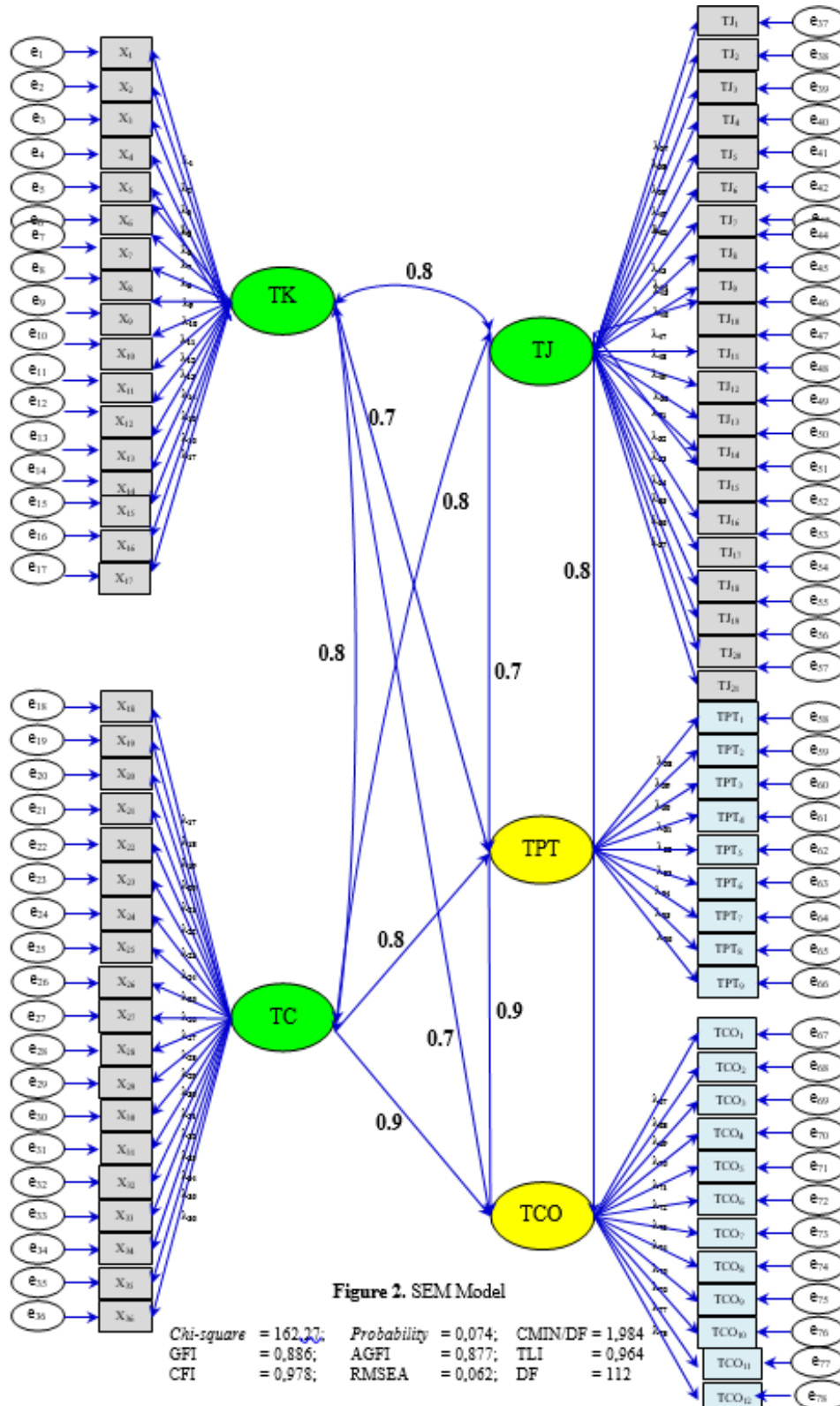| Goodness of fit indices	Cut-off value	Results	Model evaluation
Chi-square	$\chi2$ dengan DF = 83; P: 5% = 91,273	83.731	Good
Probalility	≥ 0.05	0.066	Good
CMIN/DF	< 2.00	1.748	Good
GFI	≥ 0.90	0.911	Good
AGFI	≥ 0.90	0.929	Good
TLI	≥ 0.95	0.965	Good
CFI	≥ 0.95	0.979	Good
RMSEA	≤ 0.08	0.073	Good

The exogenous latent variable confirmatory model is feasible to be tested at the full-model stage. This is indicated by the value of the calculation results that meet the criteria of a decent model based on various parameters of the feasible model (goodness of fit indices).

Table 5 illustrates that all the parameter values obtained meet the specified cut-off value. The results of the calculation show that each of the forming indicators of each exogenous latent variable meet the criteria, indicated by the critical value (CR), which is greater than 2.58 with probability (P) less than 0.01. Conversely, there is no specific variable that influences the second endogenous latent variable (tax compliance). Therefore, a confirmatory analysis of the second endogenous latent variable is not applied in this study.

4.2.5 Structural equation modeling analysis

Structural equation modeling (SEM) consists of two types: (1) SEM with a covariance-based approach, in which the statistical tools are AMOS/LISREL, and (2) SEM with a variant/component-based approach (Chin, 1998; Fornell and Bookstein, 1982). This study employs LISREL because the sample is more than 500 people. The results of data processing for SEM analysis in the full model are presented in Figure 2.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Figure 2. SEM Model

Chi-square	= 162,22;	Probability	= 0,074;	CMIN/DF	= 1,984
GFI	= 0,886;	AGFI	= 0,877;	TLI	= 0,964
CFI	= 0,978;	RMSEA	= 0,062;	DF	= 112

Figure 2 shows that the full-model analysis meets the fit criteria. This is indicated by the value of the calculation that meets the eligibility criteria for the full model. The test results in the full-model analysis are also converted into tabular form as seen in Table 6.

Table 6. Full-Model Test Results

Goodness of fit indices	Cut-off value	Results	Model evaluation
Chi-square	χ2 dengan DF = 112; P: 5% = 168.800	162.271	Good
Probalility	≥ 0.05	0.089	Good
CMIN/DF	< 2.00	1.984	Good
GFI	≥ 0.90	0.886	Good
AGFI	≥ 0.90	0.877	Good
TLI	≥ 0.95	0.963	Good
CFI	≥ 0.95	0.978	Good
RMSEA	≤ 0.08	0.062	Good

The results of the chi-square test calculation on the full model show that the chi-square value of 162.271 is smaller than the chi-square table for 112 degrees of freedom at a significant level (ρ) 5% of 168.800.

Table 6 shows that all parameter values obtained meet the specified cut-off value. Therefore, it can be concluded that the exogenous latent variables meet the criteria for the fit model (goodness of fit indices). Based on these results, all exogenous latent variables can be processed with the full model. SEM results testing is then carried out through the calculation of full-model regression weights. The calculation results show that of the seven hypotheses tested, there are four influences with a CR value smaller than 2.58 and a P value greater than 0.01, namely, the effect of tax knowledge on taxpayers' trust, the influence of tax knowledge on tax compliance, the effect of tax complexity on taxpayers' trust, and the effect of tax complexity on tax compliance. Based on these results, these four hypotheses are rejected. In conclusion, only three of the seven hypotheses that use CFA with the SEM approach are accepted.

4.2.6 Evaluate the criteria for goodness of fit

Goodness of fit evaluation aims to assess how well the research model is being developed. One way is to test the normality of the data. The data normality test seeks to test whether the regression model has normal data distribution by using the Skewness–Kurtosis test. The values of Z-Skewness and Z-Kurtosis are shown in Table 7.

Table 7. Results of Data Normality Test

Observed values	TCO	TPT	TK	TC	TJ
Z-Skewness	-1.723	-1.837	1.542	1.976	1.612
Z-Kurtosis	1.961	-1.488	-1.863	1.265	1.070

TCO = Tax compliance; TPT = Taxpayers' trust; TK = Tax knowledge; TC = Tax complexity; TJ = Tax justice

Table 7 shows that none of the tested variables has Z-Skewness and Z-Kurtosis values smaller than -2.58 and greater than +2.58. Based on these results, it can be concluded that the data for the five research variables were normally distributed.

4.2.7 Model interpretation and modification

A good model has a small standard residual covariance value. The standard residual covariance allowed is +2.58. These results show that the standard residual covariance exceeds +2.58 in 12 factors. The 12 factors include x3 (bachelor degree), x7 (tax course), x8 (comparative tax study), x17 (self-employed), x23 (difficulty calculating taxable income), x28 (online completion of tax registration), x34 (overly long sentences), x41 (bias), x48 (appropriateness), x49 (timeliness), x53 (taxpayers' technical competency) and x65 (social norms). Based on these results, data modification of the full model is not necessary because only a few indicators exceed +2.58.

4.2.8 Hypotheses testing

Results of the research show that the first hypothesis (H1) has a critical ratio (CR) value of 2.467 < 2.58 and probability (P) of 0.018 ≥ 0.01, meaning H1 is rejected. This shows that tax knowledge has no effect on taxpayers' trust. The second hypothesis (H2) has a CR value of 2.496 < 2.58 and P of 0.013 ≥ 0.01, meaning H2 is rejected. This result shows that tax complexity has no effect on taxpayers' trust. The third hypothesis (H3) has a CR value of 2.593 ≥ 2.58 and P of 0.002 < 0.01, meaning H3 is accepted. This result shows that tax justice influences taxpayers' trust. The fourth hypothesis (H4) has a CR value of 2.521 < 2.58 and P of 0.054 ≥ 0.01, meaning H4 is rejected. This result shows that tax knowledge has no effect on tax compliance. The fifth hypothesis (H5) has a CR value of 2.368 < 2.58 and P of 0.059 ≥ 0.01, meaning H5 is rejected. This result illustrates that tax complexity has no effect on tax compliance. The sixth hypothesis (H6) has a CR value of 2.685 ≥ 2.58 and P of 0.004 < 0.01, meaning H6 is accepted. This result shows that tax justice influences tax compliance. The seventh hypothesis (H7) has a CR value of 5,727 ≥ 2,58 and P of 0.003 < 0.01, meaning H7 is accepted. This result shows that taxpayers' trust influences tax compliance.

4.3 Z-test analysis

The following is the result of differences in levels of tax compliance before and after the implementation of a short message service (SMS) blast program (see Table 8).

Table 8. Differences in Individual Tax Compliance Levels Before and After the Implementation of the SMS Blast Program

Implementation of SMS Blast				Finding
Before		After		
x	μ	x	μ	
4.31	5.62	7.09	8.08	$\overline{x} \neq \mu$

The result of the Z-test (particularly, two-way hypotheses with SPSS as a statistical tool) shows that there are differences in tax-compliance levels after the implementation of the SMS blast program. This is because the average value of the population (x) does not equal the average sample (μ). Before the implementation of the SMS blast, the tax-compliance levels of the semi-noncompliant groups of individual taxpayers, which are a combination of PNFT and NPFT, are better than that of NPNFT. After the implementation of this program, the semi-noncompliant groups became more compliant and partly turned into compliant group PFT. Additionally, the NPNFT group became more compliant and partially converted into a semi-noncompliant group. These facts show that there are differences of tax-compliance levels after the implementation of the SMS blast and that this program is effective in increasing tax compliance in South Sumatra. Therefore, the eighth hypothesis (H8) of this research is accepted.

This study finds that tax knowledge does not affect taxpayers' trust. It reveals that the availability of dimensions along with indicators that form tax knowledge are not able to influence the trust of individual taxpayers. This finding corresponds to the results of Manual and Xin (2016). However, there are some important differences between the two studies, especially regarding variable indicators. "Remembering" was the strongest indicator of the tax-knowledge variable, while "tax training" was the weakest.

This research also reveals that tax knowledge has no effect on tax compliance, similar to a study by Fauziati, Minovia, Muslim, and Nasrah (2016). Based on these two findings, this study suggests that the Indonesian tax authorities need to provide more tax training to improve taxpayers' knowledge, as explained by Anderson et al. (2001). Moreover, this study shows that tax complexity does not affect the trust of individual taxpayers. This contradicts results reported by Budak and James (2018), Forest and Sheffrin (2002), and Mahangila (2017). This study also notices that tax complexity has no effect on tax compliance. In contrast, Kirchler et al. (2006) argue that the possibililiy of taxpayers to comply is higher when tax laws are less complex.

This study reveals that "appropriateness of tax rates increase" and "difficulty in calculating taxable income" are the strongest indicators of tax complexity, while "overly long sentences" and the "use of difficult words in tax forms" are the weakest. This study also reveals that tax justice affects the trust of taxpayers. Similarly, Faizal and Palil (2015), who researched individual taxpayers in Malaysia, prove that the perception of tax justice impacts taxpayers' trust. In this research, "correction" was the most robust indicator of tax justice that affects taxpayers' confidence in taxes, while "criminal sanction" was the weakest. Additionally, tax justice was found to influence tax compliance. These findings support the results of Gilligan and Richardson (2005). Concerning the measures of the tax justice variable, this study notices that "consistency," "compatibility," 'correction," "respect," "appropriateness," and "tax penalties" are the most robust indicators of tax justice that affect tax compliance. Conversely, the "bias" indicator is the weakest. Furthermore, this study exhibits that taxpayers' trust influences tax compliance, similar to a study by Damayanti and Martono (2018), who utilize the slippery slope theory in their research. This present research also contributes to the findings of "obedience to the law," "trust in tax authority action," and "legal norms" as the strongest gauges of taxpayers' trust that affect tax compliance, while "sense of responsibility," "social norms," and "personal norms" are the weakest.

Finally, this study shows that there are differences in tax-compliance levels after the implementation of the SMS blast program. This is in line with that of Wardani and Wati (2018), who discovered significant differences before and after the enactment of tax counseling. This study also offers the categorisation of noncompliant registered individual taxpayers, consisting of paying-nonfiling taxpayers (PNFT), filing-nonpaying taxpayers (FNPT), and nonpaying-nonfiling taxpayers (NPNFT), as the novelty of this research. This is because none of the previous studies have focused on the differences in tax-compliance levels among individual taxpayers before and after the implementation of certain tax schemes.

5. Conclusions

This study has shown that tax justice and taxpayers' trust are determinants of tax compliance in South Sumatra, Indonesia. However, two other variables analyzed in this study, namely, tax knowledge and tax complexity, are proven to not influence tax compliance. The survey results also show that tax complexity has the lowest score among the variables. Therefore, tax authorities need to reassess their policies in improving tax compliance and give more attention to weak predictors of variable indicators, particularly those with the lowest scores. Additionally, this study reveals differences in tax-compliance levels after the implementation of the SMS blast program.

The findings of this study have three main implications. First, it provides a comprehensive review of prior research that had studied the influence of economic and noneconomic factors on tax compliance. Second, it determines which variables are significant predictors of the outcome variables. This relates to the four variables involved in this study as determinants of tax compliance: tax knowledge, tax complexity, tax justice, and taxpayers' trust. By understanding the determinants of tax compliance, the management team of tax authorities in South Sumatra will be able to find solutions to repair and upgrade the variables that have no effect on tax compliance. Third, this study delivers suggestions to the Indonesian tax authorities for improving tax compliance not only based on accelerated tax revenue but also new tax revenue generated from nonpaying-nonfiling taxpayers (NPNFT). The key direction for future research is a wider coverage of respondents to include registered and unregistered taxpayers as well as samples that capture the voice of the population and taxpayers in other regions. This will provide a more comprehensive explanation of the low tax compliance phenomenon in Indonesia.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behaviour and Human Decision Processes*, *50*, 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Alm, J. (2018). What motivates tax compliance? *Journal of Economic Surveys*, *33*(2), 1–36. https://doi.org/10.1111/joes.12272

American Institute of Certified Public Accountants. (1992). Blueprint for tax simplification. AICPA. Reviewed September 24, 2019 from https://core.ac.uk/download/pdf/147632736.pdf

Anderson, L. W., Krathwohl, D. R., Airasian, P. W., Cruikshank, K. A., Mayer, R. E., Pintrich, P. R., Raths, J. & Wittrock, M. C. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's Taxonomy of educational objectives* (Abridged E; L. W. Anderson & D. R. Krathwohl, Eds.). Longman.

Araki, S., & Claus, I. (2014). A comparative analysis of tax administration in Asia and the Pacific. Asian Developmet Bank. Reviewed May 5, 2020 from https://core.ac.uk/download/pdf/144981435.pdf

Asrinanda, & Diantimala, Y. (2018). The effect of tax knowledge, self assessment system, and tax awareness on taxpayer compliance. *Review of Public Administration and Management*, *8*(10), 539–550. https://doi.org/10.6007/IJARBSS/v8-i10/4762

Bărbuţă-Mişu, N. (2011). A review of factors for tax compliance. Annals of "Dunarea de Jos" University of Galati Fascicle I. *Economics and Applied Informatics Years*, *17*(1), 69–76. Retrieved from https://core.ac.uk/download/pdf/26692348.pdf

Belay, S. A., & Viswanadham, P. (2016). Tax fairness perceptions and compliance behavior: Evidence from the Metropolitan Cities of the Amhara Regional State of Ethiopia. *International Journal of Science and Research (IJSR)*, *5*(4), 1173–1183. Retrieved May 9, 2020 from https://pdfs.semanticscholar.org/7b56/09b1ffd20f0d893919e8ad7f3471912b5b7f.pdf

Benk, S., Budak, T., & Cakmak, A. (2012). Tax professionals' perceptions of tax fairness: Survey evidence in Turkey. *International Journal of Business and Social Science*, *3*(2), 112–117. Retrieved May 9, 2020 from http://www.ijbssnet.com/journals/Vol_3_No_2_Special_Issue_January_2012/13.pdf

Bernard, O. M., Memba, F. S., & Oluoch, O. (2018). Influence of tax knowledge and awareness on tax compliance among investors in the Export Processing Zones in Kenya. *International Journal of Scientific Research and Management (IJSRM)*, *06*(10), 728–733. https://doi.org/10.18535/ijsrm/v6i10.em01

Bird, R. M., Martinez-Vazquez, J., & Torgler, B. (2008). Tax effort in developing countries and high income countries: The impact of corruption, voice and accountability. *Economic Analysis and Policy*, *38*(1), 55-71. Retrieved June 21, 2020 from https://www.researchgate.net/publication/4802491_Tax_Effort_in_Developing_Countries_and_High_Income_Countries_The_Impact_of_Corruption_Voice_and_Accountability

Bornman, M. (2015). The determinants and measurement of trust in tax authorities as a factor influencing tax compliance behavior. *Journal of Economic and Financial Sciences*, *8*(3), 772–789. https://doi.org/10.4102/jef.v8i3.121

Brainyyah, M. Q., & Rusydi, M. K. (2016). The effect of tax fairness, tax knowledge, and tax complexity on tax compliance: The case of SME entrepreneurs' taxpayers in Malang. *Jurnal Ilmiah Mahasiswa FEB Universitas Brawijaya*, 1–17. Retrieved May 9, 2020 from https://jimfeb.ub.ac.id/index.php/jimfeb/article/view/519

Budak, T., & James, S. (2018). The level of tax complexity: A comparative analysis between the UK and Turkey based on the OTS Index. *International Tax Journal*, February 27-40. Retrieved May 9, 2020 from https://www.researchgate.net/publication/323525598_The_Level_of_Tax_Complexity_A_Comparative_Analysis_Between_the_UK_and_Turkey_Based_on_the_OTS_Index

Chau, G., & Leung, P. (2009). A critical review of Fischer tax compliance model: A research synthesis. *Journal of Accounting and Taxation*, *1*(2), 034–040. https://doi.org/10.5897/JAT09.021

Chin, W. W. (1998). Issues and opinion on structural equation modeling. *MIS Quarterly*, 22(1), 7–16. Retrieved May 9, 2020 from https://www.researchgate.net/publication/220260360_Issues_and_Opinion_on_Structural_Equation_Modeling

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Colquitt, J. A. (2001). On the dimensionality of organizational justice: A construct validation of a measure. *Journal of Applied Psychology*, *86*(3), 386–400. https://doi.org/10.1037//0021-9010.86.3.386

Cox, S. P., & Eger III, R. J. (2006). Procedural complexity of tax administration: the road fund case. *Journal of Public Budgeting, Accounting & Financial Management*, *18*(3), 259–283. https://doi.org/10.1108/JPBAFM-18-03-2006-B001

Damayanti, T., & Martono, S. (2018). Taxpayer compliance, trust, and power. *Jurnal Keuangan Dan Perbankan*, *22*(2), 231–239. https://doi.org/10.26905/jkdp.v22i2.1580

Fahr, R., & Djawadi, B. M. (2013). The impact of tax knowledge and budget spending influence on tax compliance (IZA Discussion Paper No. 7255). Retrieved May 9, 2020 from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2234277

Faizal, S. M., & Palil, M. R. (2015). Study on fairness and individual tax compliance in malaysia: preliminary findings. *International Journal of Business, Economics and Law, 8*(1), 74–79. Retrieved May 5, 2019 from http://ijbel.com/wp-content/uploads/2016/01/Acc-35.pdf

Fajarwati, R. N., Kertahadi, & Kurniawan, B. C. (2004). Analisis peningkatan kepatuhan wajib pajak sebelum dan sesudah penerapan modernisasi administrasi perpajakan (studi pada Kantor Pelayanan Pajak Pratama se Malang Raya). *Jurnal Mahasiswa Perpajakan*, 1–10. Retrieved August 23, 2020 from http://perpajakan.studentjournal.ub.ac.id/index.php/perpajakan/article/view/42/36

Farrar, J. M., Donnelly, M. E., & Dhaliwal, S. B. (2013). Procedural aspects of tax fairness: A content analysis of Canadian tax jurisprudence. *The ATA Journal of Legal Tax Research*, *11*(2), 21–37. https://doi.org/10.2308/jltr-50552

Forest, A., & Sheffrin, S. M. (2002). Complexity and compliance: An empirical investigation. *National Tax Journal*, *55*(1), 75–88. https://doi.org/10.17310/ntj.2002.1.05

Fornell, C., & Bookstein, F. L. (1982). Two structural equation models: LISREL and PLS applied to consumer exit-voice theory. *Journal of Marketing Research*, *19*(4), 440–452. https://doi.org/10.2307/3151718

Gambo, E.-M. J., Mas'ud, A., Nasidi, M., & Oyewole, O. S. (2014). Tax complexity and tax compliance in African self-assessment environment. *International Journal of Management Research & Review (IJMRR)*, *4*(5), 575–582. Retrieved May 10, 2020 from https://www.academia.edu/7339168/Tax_Complexity_and_Tax_Compliance_in_African_Self_Assessment_Environment

Gberegbe, F. B., Idornigie, G. A., & Nkanbia-Davis, L. O. (2015). Perception of tax fairness and personal income tax compliance in Ken Saro-Wiwa Polytechnic, Bori. *IOSR Journal of Economics and Finance (IOSR-JEF)*, *6*(6), 1–11. https://doi.org/10.9790/5933-06610111

Gberegbe, F. B., & Umoren, A. O. (2017). The perception of tax fairness and personal income tax compliance of Smes in Rivers State. *Journal of Research in Business and Management*, *5*(2), 40–51. Retrieved May 5, 2019 from http://www.questjournals.org/jrbm/papers/vol5-issue2/E524051.pdf

Gilligan, G., & Richardson, G. (2005). Perceptions of tax fairness and tax compliance in Australia and Hong Kong-A preliminary study. *Journal of Financial Crime*, *12*(4), 331–343. https://doi.org/10.1108/13590790510624783

Gitaru, K. (2017). *The effect of taxpayer education on tax compliance in Kenya (a case study of SME's in Nairobi Central Business District)* (MPRA Paper 80344). Retrieved from https://mpra.ub.uni-muenchen.de/80344/

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.) Pearson Education Limited.

Indonesian Directorate General of Taxes (2018). *2018 performance report*. Retrieved August 22, 2020 from https://pajak.go.id/sites/default/files/2019-05/LAKIN%20DJP%202018.pdf

Husaini, Pirzada, K., Saiful, (2020). Risk Management, Sustainable Governance Impact on Corporate Performance. *Journal of Security and Sustainability Issues*, 9(3), 993-1004. https://doi.org/10.9770/jssi.2020.9.3(23)

Istiqamah, N., Herwanti, T., & Surasni, N. K. (2018). The influence of tax knowledge, tax penaltied and internal control system on treasures' tax compliance in Bima Municipality, West Nusa Tenggara Province, Indonesia. *International Journal of Economics, Commerce and Management*, *6*(2), 598–608. Retrieved May 10, 2020 from http://ijecm.co.uk/wp-content/uploads/2018/02/6238.pdf

Kastlunger, B., Lozza, E., Kirchler, E., & Schabmann, A. (2013). Powerful authorities and trusting citizens: The Slippery Slope Framework and tax compliance in Italy. *Journal of Economic Psychology*, *34*, 36–45. https://doi.org/10.1016/j.joep.2012.11.007

Kirchler, E. (2007). *The Economic psychology of tax behaviour*. Cambridge University Press.

Kirchler, E., Kogler, C., & Muehlbacher, S. (2014). Cooperative tax compliance: From deterrence to deference. *Current Directions in Psychological Science*, *23*(2), 87–92. https://doi.org/10.1177/0963721413516975

Kirchler, E., Niemirowski, A., & Wearing, A. (2006). Shared subjective views, intent to cooperate and tax compliance: Similarities between Australian taxpayers and tax officers. *Journal of Economic Psychology, 27*, 502–517. https://doi.org/10.1016/j.joep.2006.01.005

Kogler, C., Batrancea, L., Nichita, A., Pantya, J., Belianin, A., & Kirchler, E. (2013). Trust and power as determinants of tax compliance: Testing the assumptions of the slippery slope framework in Austria, Hungary, Romania and Russia. *Journal of Economic Psychology*, *34*, 169–180. https://doi.org/10.1016/j.joep.2012.09.010

Komalasari, P. T., & Nasih, M. (2010). Tingkat kepatuhan wajib pajak dan tarif pajak: Uji pengaruh karakteristik pendapatan. *Jurnal Manajemen Teori Dan Terapan*, *3*(2), 112–128. https://doi.org/10.20473/jmtt.v3i2.2396

Krause, K. (2000). Tax complexity: Problem or opportunity? *Public Finance Review*, *28*(5), 395–414. https://doi.org/10.1177/109114210002800501

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Linn, R. L., & Grondlund, N. E. (2000). *Measurement and assessment in teaching* (8th ed.). Pearson Education. https://doi.org/10.1177/0734282906286619

Mahangila, D. (2017). The impact of tax compliance costs on tax compliance behaviour. *Journal of Tax Administration*, *3*(1), 57–81. Retrieved May 15, 2020 from https://www.researchgate.net/publication/317560428_THE_IMPACT_OF_TAX_COMPLIANCE_COSTS_ON_TAX_COMPLIANCE_BEHAVIOUR

Manual, V., & Xin, A. Z. (2016). Impact of tax knowledge, tax compliance cost, tax deterrent tax measures towards tax compliance behavior: A survey on self-employed taxpayers in West Malaysia. *Electronic Journal of Business and Management*, *1*(1), 56–70. Retrieved May 11, 2020 from http://www.apu.edu.my/ejournals/ejbm/journal/2016/Paper6_Impact_of_Tax_Knowledge_Tax_Compliance_Cost.pdf

McCaffery, E. J. (1990). The holy grail of tax simplification. *Wisconsin Law Review*, *5*, 1267–1322. Retrieved May 11, 2020 from https://heinonline.org/HOL/LandingPage?handle=hein.journals/wlr1990&div=51&id=&page=

McKerchar, M. (2005). The impact of tax complexity on practitioners in Australia. *Australian Tax Forum*, *20*(4), 529–554. Retrieved July 28, 2019 from https://heinonline.org/HOL/LandingPage?handle=hein.journals/austraxrum20&div=17&id=&page=

Muehlbacher, S., Kirchler, E., & Schwarzenberger, H. (2011). Voluntary versus enforced tax compliance: empirical evidence for the "slippery slope" framework. *European Journal of Law and Economics*, *32*(1), 89–97. https://doi.org/10.1007/s10657-011-9236-9

Mukasa, J. (2011). Tax knowledge, perceived tax fairness and tax compliance in Uganda: The Case of Small and Medium Income Taxpayers in Kampala Central Division (Master's Thesis, Makarere University, Uganda). Retrieved May 11, 2020 from https://www.academia.edu/5619390/Tax_knowledge_perceived_tax_fairness_and_tax_compliance_in_Uganda

Musthapha, B. (2010). The impact of tax fairness and demographic factors on tax compliance in Nigeria. Master's Thesis, Universiti Utara Malaysia. Retrieved May 12, 2020 from https://www.academia.edu/1609100/The_Impact_of_Tax_Fairness_and_Demographic_Factors_on_Tax_Compliance_in_Nigeria

Najah, S. (2008). Analisis Perbedaan Tingkat Kepatuhan Wajib Pajak Badan dalam Memenuhi Kewajiban Perpajakan Sebelum dan Sesudah Tax Audit (Studi Kasus pada KPP Pratama Jakarta Tebet) (Master's Thesis, UIN Syarif Hidayatullah). Retrieved August 23, 2020 from http://repository.uinjkt.ac.id/dspace/bitstream/123456789/12902/1/SAFINATUN NAJAH-FEB.pdf

Newman, W., & Nokhu, M. (2018). Evaluating the impact of tax knowledge on tax compliance among small medium enterprises in a developing country. *Academy of Accounting and Financial Studies Journal*, *22*(6), 1–14. https://www.abacademies.org/articles/Evaluating-the-Impact-of-Tax-Knowledge-on-Tax-Compliance-Among-Small-Medium-Enterprises-1528-2635-22-6-302.pdf

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York, US: Mac Graw-Hill.

OECD. (2008). *Globalisation and emerging economies*. https://doi.org/https://dx.doi.org/10.1787/9789264044814-en

OECD. (2017). *Revenue statistics in Asian countries 2017*. https://doi.org/https://dx.doi.org/10.1787/9789264278943-en

Olaoye, C. O., Ayeni-Agbaje, A. R., & Alaran-Ajewole, A. P. (2017). Tax information, administration and knowledge on taxpayers' compliance of block moulding firms in Ekiti State. *Journal of Finance and Accounting*, *5*(4), 131–138. https://doi.org/10.11648/j.jfa.20170504.12

Palil, M. R., Akir, M. R. M., & Ahmad, W. F. B. W. (2013). The perception of taxpayers on tax knowledge and tax education with level of tax compliance: A study the influences of religiosity. *ASEAN Journal of Economics, Management and Accounting*, *1*(1), 118–129. Retrieved May 24, 2018 from https://fem.ipb.ac.id/miicema/e-journal/v1n1/8.pdf

Pau, C., Sawyer, A. J., & Maples, A. (2007). Complexity of tax simplification: A New Zealand perspective. *Australian Tax Forum*, *22*(1), 59–92. https://doi.org/10.1057/9781137478696

Richardson, G. (2006). Determinants of tax evasion: A cross-country investigation. *Journal of International Accounting, Auditing and Taxation*, 15(2), 150–169. https://doi.org/10.1016/j.intaccaudtax.2006.08.005

Richardson, M., & Sawyer, A. J. (1998). Complexity in the expression of New Zealand tax laws: An empirical analysis. *Australian Tax Forum*, 14(3), 325–360. https://doi.org/10.1057/9781137478696

Rudyanto, A. and Pirzada, K. (2020). The role of sustainability reporting in shareholder perception of tax avoidance. *Social Responsibility Journal*, No. ahead-of-print. https://doi.org/10.1108/SRJ-01-2020-0022

Saad, N. (2014). Tax Knowledge, Tax Complexity and Tax Compliance: Taxpayers' View. *Procedia - Social and Behavioral Sciences*, 109(1), 1069–1075. https://doi.org/10.1016/j.sbspro.2013.12.590

Saw, K., & Sawyer, A. J. (2010). Complexity of New Zealand's income tax legislation. *Australian Tax Forum*, *25*, 213–244. Retrieved May 12, 2020 from https://heinonline.org/HOL/LandingPage?handle=hein.journals/austraxrum25&div=12&id=&page=

Sidik, M. H. J., Zandi, G. R., & Ruhoma, A. A. (2019). Examining the influence of fairness perception on tax compliance behavior the Libya individual taxpayers: The moderating tax awareness and tax complexity. *Humanities & Social Sciences Reviews*, 7(2), 519–525. https://doi.org/10.18510/hssr.2019.7261

Stewart, C. (2009). A multidimensional measure of professional learning communities: The development and validation of the Learning Community Culture Indicator (Doctoral dissertation, Brigham Young University, Provo, UT). https://doi.org/10.13140/2.1.4432.2246

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Susanto, Y. K., Pirzada, K., & Adrianne, S. (2019). Is tax aggressiveness an indicator of earnings management? *Polish Journal of Management Studies*, 20 (2) 516-527. http://doi.org/10.17512/pjms.2019.20.2.43

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach' s alpha. *International Journal of Medical Education*, 2(1), 53–55. https://doi.org/10.5116/ijme.4dfb.8dfd

Terre, B. M., Durrheim, K., & Painter, D. (2006). *Research in practice: Applied methods for the social sciences* (2nd ed.). UCT Press.

Wahl, I, Kastlunger, B., & Kirchler, E. (2010). Trust in authorities and power to enforce tax compliance: An Empirical Analysis of the "slippery slope framework". *Law & Policy*, *32*(4), 383–406. https://doi.org/10.1111/j.1467-9930.2010.00327.x

Wardani, D. K., & Wati, E. (2018). Wajib pajak dengan pengetahuan perpajakan sebagai variabel intervening (Studi pada wajib pajak orang pribadi di KPP Pratama Kebumen). *Jurnal Nominal*, *7*(1), 22–54. Retrieved August 23, 2020 from https://journal.uny.ac.id/index.php/nominal/article/view/19358/10682

World Bank. (2019). *Gross domestic product 2018*. Retrieved July 27, 2019 from https://databank.worldbank.org/data/download/GDP.pdf

Musthafa Kemal NASUTION is a PhD candidate in management science, Faculty of Business and Economics at University of Bengkulu, Bengkulu, Indonesia. He is currently working as the head of the Tax Audit Section at the Indonesian Directorate General of Taxes. Research interests: taxation. behavioral finance.
ORCID ID: https://orcid.org/0000-0002-7337-7621

Fitri SANTI is an Associate Professor of management and finance in the Management Department, University of Bengkulu. She works at the University of Bengkulu, Faculty of Economics and Business. Research fields: banking, finance and investement, behavioral finance and corporate governance. She has published papers both in national and international journals and presented papers at various international conferences.
ORCID ID: https://orcid.org/0000-0002-2404-5604

HUSAINI is an Associate Professor of Accounting in the Accounting Department, University of Bengkulu. He works at the University of Bengkulu, Faculty of Economics and Business. Research fields: corporate governance, risk management, and auditing.
ORCID ID: https://orcid.org/0000-0001-6482-9844

FADLI is a lecturer and researcher in the Accounting Department, University of Bengkulu. He works at the University of Bengkulu, Faculty of Economics and Business. His research fields are accounting and management.
ORCID ID: https://orcid.org/0000-0001-6874-1858

Kashan PIRZADA is an Asst. Prof. of financial accounting at the Asian Research Institute for Corporate Governance (AIRCG) and Tunku Puteri Intan Safinaz School of Accountancy, Universiti Utara Malaysia. He continues researching on financial accounting issues in both advanced capitalist countries and emerging/less-developed countries.
ORCID ID: https://orcid.org/0000-0003-1186-0631

ENTREPRENEURSHIP AND SUSTAINABILITY CENTER

Publisher
http://jssidoi.org/esc/home

enterprise europe network
Business Support on Your Doorstep

OASPA

Scopus

Clarivate Analytics

ENVIRONMENTAL ISSUES AND SOCIAL RESPONSIBILITY: A SCIENTOMERIC ANALYSIS USING CITESPACE*

Zixuan Zeng [1]*, Thammanoon Hengsadeekul [2]

[1,2] *Faculty of Logistics and Digital Supply Chain, Naresuan University, 99 Moo.9, Thapo, Mueang, 65000, Phitsanulok, Thailand*
[1] *Guangxi University of Finance and Economics, No. 100, Mingxiuxi Road, Xixiangtang District, 530000, Nanning, China*

*E-mails: [1]*zixuanz61@nu.ac.th (Corresponding author); [2]thammanoonh@nu.ac.th*

Abstract. Environmental issues and social responsibility have a significant impact on the natural ecological system and economic development. Hence, it is essential to find a relative balance path between them. Previous studies have sought to explore environmental and social responsibility rather than seek solutions from a systematic perspective, and there seems to be a lack of a systematic quantitative review of periodic solutions or details. To identify multiple impacts and relationships between environmental issues and social responsibility and to illustrate emerging trends and challenges, this article proposes a scientometrics review based on 1,336 articles published from 2001 to 2020, through co-occurrence analysis and co-citation analysis together with cluster and burstiness analysis to reveal the depth and breadth of emerging research. This research demonstrates the research paradigm of environmental issues and social responsibility, extending from a single stakeholder level to a systematic strategic perspective of multiple organizations and stakeholders. The results provide researchers and practitioners with a deeper understanding of future directions and implications.

Keywords: environmental issues; social responsibility; strategy; scientometrics; review

1. Introduction

Many scholars and experts have been concerned about environmental issues for a long time and considered a strategy by many corporates (Reinhardt, 1998; Aragón-Correa et al., 2008; Tvaronavičienė & Ślusarczyk, 2019; Ji et al., 2019; Cismas et al., 2019; Khan et al., 2020; Yeganeh Kia, 2020; Mazzoni, 2020).

Meanwhile, the discussion on social responsibility has never stopped in academic circles. After one of the representative scholar Archie B. Carroll (1979) proposed a three-dimensional model and conducted the evolution of social responsibility (Archie B. Carroll, 1999), numerous scholars were exploring the relationship between social responsibility and other variables, especially from the corporate aspect. These include the strategic implication of social responsibility (McWilliams et al., 2006), social responsibility and financial performance (Cochran & Wood, 1984; McGuire et al., 1988), and Islamic religious education (Husni, 2020). In the mid of 2010s, Zeng et al. (2015) determined megaproject social responsibility (MSR) as the *social responsibility of major infrastructure projects involving the policies and practices of the stakeholders who participated through the whole project life-cycle that reflects the responsibilities for the well-being of the wider society*. An intelligent concept combined with the development trends, people's needs, social responsibility, and environmental issues.

One of the most controversial issues on infrastructure is building megaprojects. It cost many social resources and environmental resources, and they are never just a scaled-down version of small projects (Flyvbjerg, 2014). With the advent of megaprojects, a series of social and environmental problems began to emerge. Megaprojects can bring huge benefits like pulling effect on the economy, regional influence, employment, and disaster protection. However, it has some drawbacks, like environmental problems and socio-economic issues (He et al., 2019). Therefore, environmental compensation is as vital as technology, economics, culture, and supervision, and it has received significant attention from many stakeholders (Cowell, 1997). The earliest and most popular way of environmental compensation could be the compensation principle in Germany's 1970s (Peters, 1993). The essential environmental compensation connotes that the beneficiary of ecosystem service provides a conditional payment system to the environmental income service provider to achieve environmental protection through incentive or reward.

In general, environmental degradation regulations have been introduced to solve those serious problems, but the activities are still lacking in consistency and improvement. Therefore, environmental issues need to be investigated profoundly, and innovation must be required. This paper aims to illustrate the transformation of environmental issues from a corporate level to a strategic level through antecedence studies using Scientometric analysis. It will shed light on studies on the strategic field and provide managers or policymakers with a decision. To further explore the aspects involved in the research on the environmental field and social responsibility, the specific objectives of this paper are as follows; (1) To identify the development of environmental issues and social responsibility, and publish journals and articles from 2001 to 2020 using the subject category co-occurrence network. (2) To determine the holistic research state-of-art in environmental issue and social responsibility through co-occurring keywords analysis and document co-citation analysis, as well as a burstiness analysis to illustrate the abrupt changes and emerging trends of the development in the research area.

2. Literature review

There have been few studies that systematically investigated the relationship between environmental problems and social responsibility. Hence, we presented articles on environmental issues and social responsibility to discover critical findings and research trends in environmental issues and social responsibility research.

Fernández et al. (2003) reviewed the organizational culture and human resources in environmental management. From the perspective of management duty and organizational culture to establish internal stakeholders' recognition, organizational participation in environmental issues, environmental training, environmental motivation, and organizational innovation to illustrate the significance of enterprises' environmental strategy. Reinhardt & Stavins (2010) demonstrated the relationship between corporate social responsibility (CSR), business strategy, and environment. Corporates who are willing to participate in CSR, including more extensive companies, lousy performance on environmental issues, more pressure from the NGOs and the public, and final product production. CSR activities from private firms like the transparency of CSR report, CSR plans, environmental management systems, or plans related to social beneficially. For business strategy and environment, Margolis et al. (2007) suggested that profitable companies are more willing to participate in CSR activities, and in the long run, environmental protection would bring better profits to companies (Reinhardt & Stavins, 2010). Scholars intend to identify more empirical relationships in the so-called multidisciplinary. Based on a large number of studies, more in-depth studies on environment, social responsibility, and business are emerging. In a recent study, J. Liu et al. (2020) examined the relationship between ISO 14001, trade openness, and environmental pressure. The results showed no correlations between them, but the relationship varies from region to region in developing countries. An environmental management system (EMS) is a crucial factor in gaining competitiveness in the market. Bravi et al. (2020) examined how the enterprise with an EMS based on ISO 14001:2015 perceives the change caused by the revision of standards. Using a questionnaire survey in 284 Italian companies, the benefits of those corporates include risk prevention, better management of environmental activities, and a new goal to reduce energy and waste. Kolk (2016) demonstrated the social responsibility issues in international business. Over the past 50 years, three themes were commonly discussing including the green environment, ethic, rights, and responsibilities, poverty, and sustainable development. Ye et al. (2020) reviewed the studies on CSR's contribution to sustainable development, which is an excellent beginning to invest the balance between environment and sustainable development.

3. Research Methodology

Web of Science (WoS) was selected as the database of Scientometric data for research sampling. Its consistency with the core collection: Science Citation Index Expanded (SCI-EXPANDED), Social Sciences Citation Index (SSCI), Arts & Humanities Citation Index (A&HCI), and Emerging Sources Citation Index (ESCI), both sources are positively influencing and significant in academia (W. Liu et al., 2020; Zhu & Liu, 2020). Firstly, a pre-analysis was conducted with the retrieval code: *TS = (environmental management* AND social responsibility)* and refined by peer-reviewed reviews and articles to found out the synonym terms. The research rule at the end *TS = (environmental compensation OR environmental offset OR compensatory mitigation OR restoration OR environmental remediation OR environmental management) AND (social responsibility OR CSR) AND (strategy OR strategical).* We retrieved a total of 1,336 papers. Figure 1 indicates the details of the bibliography presented from 2001 to 2020.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
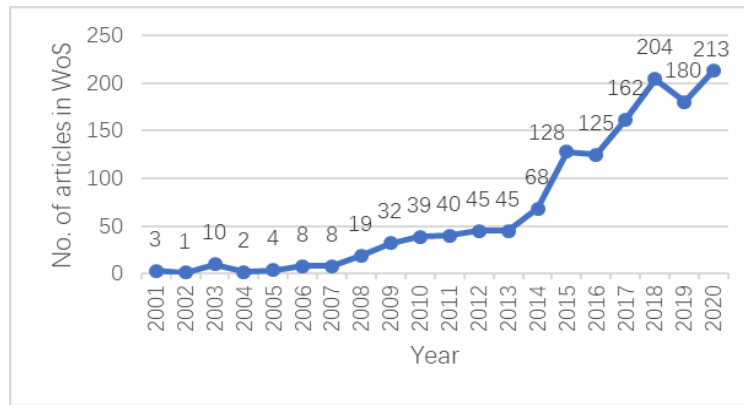

Figure 1. The number of papers published from 2001 to 2020
Source: processed primary data

This Scientometric analysis includes author co-citation analysis, document co-citation analysis, and co-word analysis. (Chaomei, 2017). It is based on mathematical static and computing techniques (Wang et al., 2018). It is essential to understand that transient articles change the perspective and development of the scientific field. Internal and external causes are included when the style of a specific research field suddenly changed, and the field trends emerge (C. Chen, 2006). We researched the abstract, title, and keywords for selected papers from WoS and put them into Citespace software to determine theme groups. Citespace is a tool that demonstrates an excellent bibliographic visualization used to analyze the kinds of literature. It can also uniquely represent research frontiers and knowledge bases, the evolution of research frontiers, and the literature that plays a key role in the evolution process (Y. Chen et al., 2015; Fang et al., 2018; Zhao et al., 2019).

This study employs co-occurrence and co-citation analysis, specifically on the subject category of co-occurrence analysis, keyword co-occurrence analysis, document co-citation analysis, and supplementary with cluster analysis and burstiness analysis. Since the keywords of scientific literature are the basic units that reflect the knowledge component of a specific subject domain, the relationship and structure of research hotspots in the field can be indirectly mapped co-occurrence frequency, which is a significant indicator (Hsin-Ning & Pei-Chun, 2010). Co-citation analysis refers to a group of literature cited by one article or the same group of literature at the same time, the cited literature constitute the co-citation relationship, and the analysis of them is called co-citation analysis (Özmen Uysal, 2010), the cited frequency is the most comment index and draws co-cited network. Within the co-cited network, the greater the literature's centrality at key nodes, the more classic literature with significant theoretical innovation, and hot literature leading the scientific research frontier. The research frontiers and knowledge bases of environmental management and social responsibility are described as visual network forms, and their contents and structures are deeply analyzed through the above methods.

4. Results and discussion

4.1 Co-word analysis

In this section, several research themes from the WoS database on environmental issues and social responsibility have been illustrated and analyze through the co-word analysis method. Specifically, subject category co-occurrence network and keyword co-occurrence network.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

3.1.1 Subject category co-occurrence network

The subject category co-occurrence network is shown in Figure 2 below. It consisted of 57 nodes and 104 connecting lines representing the research subjects of environmental issues and social responsibilities, including 57 classes, and the character was a multidisciplinary study. The size of nodes representing the number of papers in this subject and the fuchsia color of the node's outer ring represents that subject's centrality. Figure 3 illustrates the most frequent top 20 subjects in this area, including business and economics, environmental science and ecology, management, environmental studies and sciences, science and technology, green and sustainable, engineering, social science, and the like. These represent environmental and social responsibility research, starting to extend the research field on environmental and ecology issues. It is important to pay more attention to the balance between the environment and economic development. However, the highest centrality discipline is the bridge between them: engineering and environmental (125), with the centrality of 1.29.
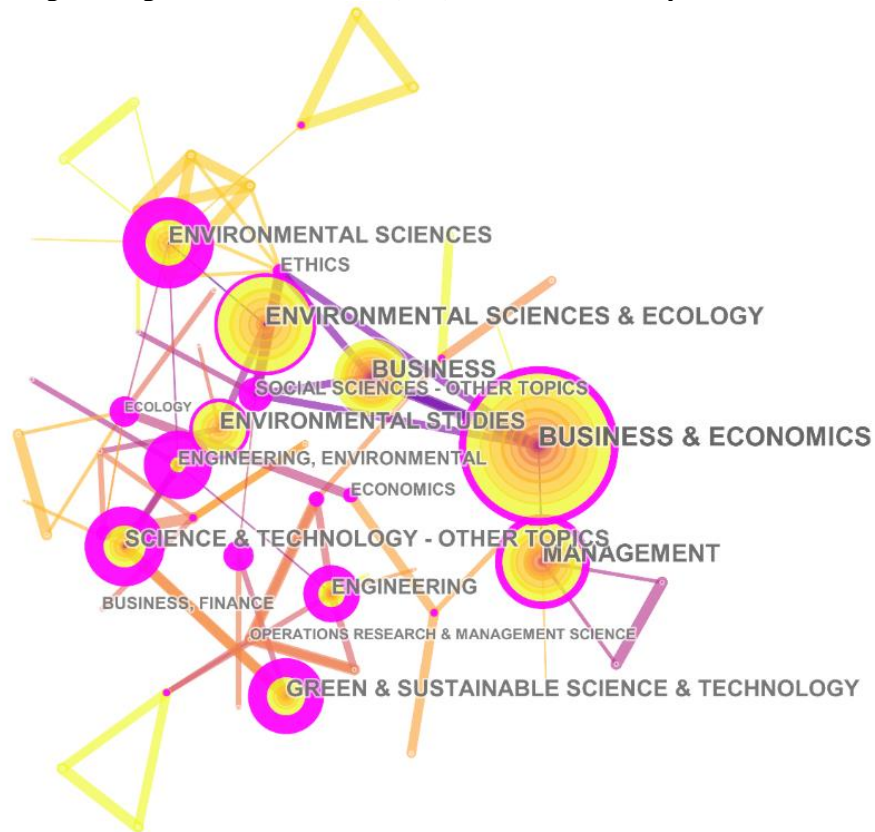

Figure 2. Subject category co-occurrence network
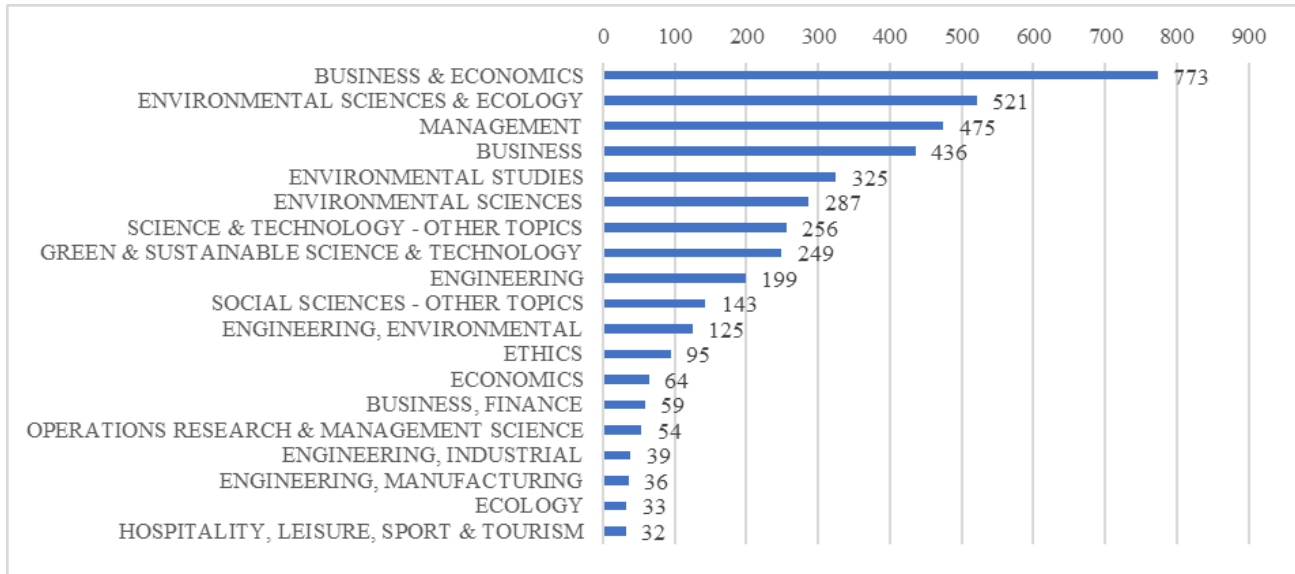*Source:* processed primary data

Figure 3. Top 20 research areas of environmental issues and social responsibility
Source: processed primary data

3.1.2 Keyword co-occurrence network and burstiness

Figure 4 shows the keyword co-occurrence network of this research field and it consists of 199 nodes and 1638 links. The size of the node is proportional to the frequency of keyword occurrence. The top 15 keywords with frequency were corporate social responsibility (frequency = 643), strategy (frequency = 457), management (frequency = 401), performance (frequency = 315), sustainability (frequency = 311), social responsibility (frequency = 211), financial performance (frequency = 203), impact (frequency = 188), csr (frequency = 174), environmental management (frequency = 160), green (frequency = 156), resource based view (frequency = 121), perspective (frequency = 119), firm (frequency = 116), and supply chain management (frequency = 113), respectively. It is important to mention that corporate social responsibility and CSR is the same in which many scholars are studying on it, social responsibility ranked sixth since the responsibility should not be only from corporates perspective. The burstiness demonstrates the most significant research area and the number of citations increased rapidly over a short period of time (Zhao et al., 2019). Totally 30 keywords with the strongest citation bursts were detected. The top five most strengthen keywords are stakeholder management (burst strength = 6.36, 2010-2014), issue (burst strength = 6.21, 2009-2012), perspective (burst strength = 5.74, 2017-2018), ethics (burst strength = 4.99, 2009-2015), and economic performance (burst strength = 4.79, 2013-2015), with the period of its emergence. From 2017 to 2020, environmental disclosure (burst strength = 3.13), CSR (burst strength = 4.31), stakeholder engagement (burst strength = 3.81), institutional theory (burst strength = 3.30), and reputation (burst strength = 3.06) illustrate that during these period scholars were paying more attention on them.

Figure 4. Keyword co-occurrence network
Source: processed primary data

3.2 Co-citation analysis

Co-citation analysis is defined as the frequency with which two articles are cited simultaneously in another article (Edge, 1979; Small, 1973; Vanraan, 1990). In this section, the document, author, and journal co-citation network will be applied together with the clustering analysis. According to 1,336 records from the processed primary data from 2001 to 2020, accurate visualization of each network is shown in the corresponding section.

3.2.1 Document co-citation network

Figure 5 shows the landscape view of the document co-citation network and clusters. It consisted of 341 nodes and 432 links between 2001 and 2020. The labels of a cluster are presented depending on the cluster size. The weighting algorithm is following the log-likelihood ratio (LLR) to ensure the precision of clustering. It is essential to mention that the modularity Q is equal to 0.7607 (Q > 0.3), which is relatively high. It means that these clusters are justified by being divided into loosely coupled clusters (He et al., 2017), since there are a lot of small clusters as a result of the mean silhouette, which is a relatively low value equal to 0.5098 (ms > 0.7) (Wang et al., 2018). The module's color represents the corresponding average year of the study co-citation of each cluster, and the label color corresponds to the module color. The indicator of the color map is illustrated in Figure 6.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
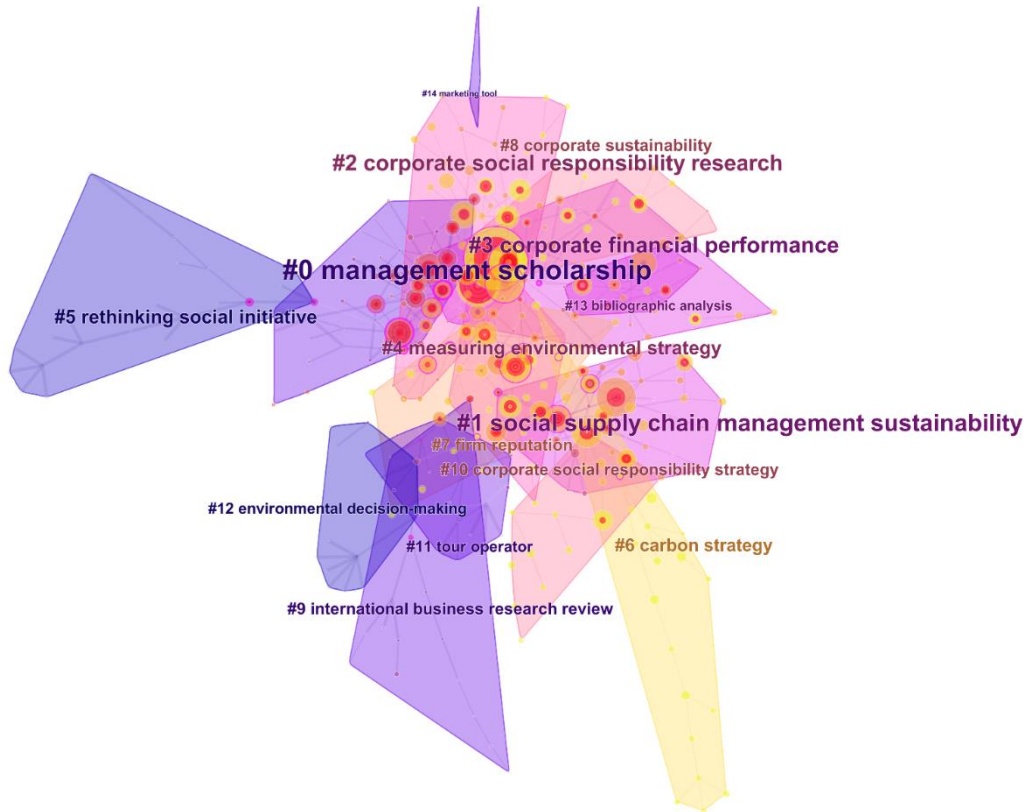
Figure 5. Document co-citation network and clusters
Source: processed primary data

Figure 6. The indicator of the color map
Source: processed primary data

There are a total of 14 clusters in this study, and the size of clusters depends on the number of papers. For instance, in Table 1, cluster#0 is the largest cluster, with the silhouette value of 0.791, which is lower than a smaller cluster, yet it is also considered as a high degree of homogeneity (Chaomei, 2017). The mean year represents the average publish year for a cluster, which illustrates whether the cluster contains older or more recent documents. For cluster #1, #2, #3, and #4, the mean year is around 2010, the mean year of cluster #0 and #5 is 2004 and 1998, respectively. More importantly, cluster #6 with the mean year in 2015 and a high silhouette value of 0.934 means the high consistency of studies, and the representative papers are essential for the cluster, and the most frequent co-citation is the representative literature.

1426

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Table 1. Top 7 co-citation clusters of environmental issues and social responsibility

Cluster ID	Size	Silhouette	Mean (Year)	Custer Label	Representative Literature
#0	45	0.791	2004	management scholarship	Porter and Kramer (2006)
#1	35	0.827	2008	social supply chain management sustainability	Seuring and Müller (2008)
#2	31	0.856	2010	CSR research	Surroca et al. (2010)
#3	30	0.72	2008	corporate financial performance	Orlitzky et al. (2011)
#4	23	0.774	2009	measuring environmental strategy	Aguinis and Glavas (2012)
#5	23	0.989	1998	rethinking social initiative	Hillman and Keim (2001)
#6	20	0.934	2015	carbon strategy	Shaukat et al. (2016)

Source: processed primary data

Cluster #0 'management scholarship' consists of 45 papers. Porter and Kramer (2006) proposed a new perspective on the relationship between business and society using a zero-sum game to analyze corporate success and social welfare. Bansal (2005) illustrated that corporates' sustainable development has a relationship between resource-based and institutional factors. The media pressure is important in the early stage, even though opportunities from the resources still existed over time, but this may depend on the corporate characteristics. Orlitzky et al. (2003) illustrated the relationship between corporate social/environmental performance and corporate financial performance and shows that performed social responsibility and little extend of environmental responsibility could increase more performance.

Cluster #1 'social supply chain management sustainability' Seuring & Müller (2008) reviewed papers on the topic of sustainable supply chain management from 1994 to 2007 and came up with two strategies on risk and performance of supplier management and sustainable project supply chain management. Moreover, the authors found out that little researches from the perspective of social aspects and sustainable development. Carter Craig and Rogers Dale (2008) introduced sustainable development into supply chain management, extended the concept of sustainability, and further strengthened this research field. Vachon and Klassen (2008) illustrated the environmental collaboration between upstream suppliers and downstream customers. The results have shown that processing performance will come closer with upstream suppliers, whereas product-based performance is more on the cooperation with downstream customers (Husaini et al., 2020).

Cluster #2 and #3, 'CSR research' and 'corporate financial performance,' Cheng et al. (2014) illustrated the CSR strategy would cause better access to finance. The result has shown that stakeholder participation and transparency of CSR were a benefit for corporate capital constraints, and further examined relationships driven from the social and environmental dimensions. Surroca et al. (2010) demonstrated no direct relationship between corporate responsibility and financial performance but formed an indirect relationship with a mediator of intangible resources, Rudyanto & Pirzada (2020). Carroll & Shabana (2010) presented CSR's business cases and how the corporate gained benefit from policies, activities, and practices. Orlitzky et al. (2011) illustrated the importance of strategic CSR and environmental sustainability, and Gimenez et al. (2012) examined the relationship between environmental programmers and social practices and the triple bottom line (environmental, social, and economic performance).

Cluster #5 'rethinking social initiative' Hillman & Keim (2001) demonstrated the shareholder value, stakeholder management, and social problem participation, and revealed that establishment of a better relationship with

stakeholders would assist corporates to explore intangible and tangible assets, and McWilliams & Siegel (2000) demonstrated the relationship between CSR to the financial performance from positive, negative, and neutral aspects, and the results showed that the relationship was neutral.

Cluster #4 and #6 'measure environmental strategy' and 'carbon strategy. Aguinis & Glavas (2012) reviewed 588 articles and 102 books with a comprehensive CSR analysis from the potential mechanism micro-based view. Darnall et al. (2010) proposed a sized moderated stakeholder model to contribute to stakeholder theory. The result showed that small-sized corporations were more sensitive to the value chain, internal regulation, and stakeholder pressures. It also illustrated the stakeholder pressure, and environmental strategies were modified according to the company size. Aguinis and Glavas (2012) illustrated that the more intention of social responsibility from the board, the more environmental and social performance are. Besides, this phenomenon was endogenous and self-reinforcing, which means that the difference between leaders increased, and it was also called competitive advantage. Liao et al. (2015) proposed suggestions on improving corporate governance and climate change strategies from the board and environmental committees. Helfaya & Moussa (2017) illustrated the relationship between the broad CSR strategy and the quantity and quality of environmental sustainability disclosure from the evidence of the UK. The result showed that it was critical of the broad CSR strategy for the stakeholder's legitimacy and accountability.

The top 20 papers with the highest citation, first author's name, and publication year are shown in Table 2. After reviewing these top 20 citation articles, the research fields included the review of corporate social responsibility (CSR) (No. 1, 12), the competitive advantage of nations and CSR (No. 2, 6), CSR works and affects the financial performance (No. 4, 5, 18, 19), the resource-based view of corporate (No. 11), stakeholder and environmental strategy (No. 7, 10), corporate sustainability (No. 13, 14, 15), sustainable supply chain management and social responsibility (No. 3, 9, 20), and the relationship between either stakeholder, financial performance, and environmental issues (No. 7, 8, 16, 17).

Table 2. Top 20 articles with highest citation on environmental issues and social responsibility

No.	Cite	Articles	No.	Cite	Articles
1	78	Aguinis and Glavas (2012)	11	33	Hart (1995)
2	54	Porter (2011)	12	33	Archie B Carroll and Shabana (2010)
3	50	Seuring and Müller (2008)	13	33	Bansal (2005)
4	48	Cheng et al. (2014)	14	29	Eccles et al. (2014)
5	48	Surroca et al. (2010)	15	28	Stefan and Paul (2008)
6	40	Porter and Kramer (2006)	16	28	Dixon-Fowler et al. (2013)
7	39	Darnall et al. (2010)	17	28	Vachon and Klassen (2008)
8	34	Aragón-Correa et al. (2008)	18	28	Matten and Moon (2008)
9	34	Carter Craig and Rogers Dale (2008)	19	27	Flammer (2012, 2013)
10	34	Sarkis et al. (2010)	20	25	Carter Craig and Liane Easton (2011)

Source: processed primary data

In addition, 144 burstiness articles were detected. The top seven articles are Porter & Kramer (2006) with a strength of 13.94, from 2010 to 2014, Bansal (2005) with a strength of 13.91, from 2007 to 2013, Orlitzky et al.

(2003) with strength 12.45, from 2007 to 2011, Seuring & Müller (2008) with strength 12.34, from 2012 to 2016, Sharma & Henriques (2005) with strength 11.52, from 2007 to 2012, Buysse & Verbeke (2003) with strength 11.40, from 2007 to 2011, Carroll & Shabana (2010) with strength 11.01, from 2016 to 2018.

Social responsibility and strategic CSR and environmental strategy are hot research fields since it is covered by cluster #0, #1, #4, #6. Hence, four research topics could be identified: sustainable supply chain management with social responsibility (cluster #0, #1), environmental carbon strategy (cluster #4, #6), CSR with stakeholder engagement and corporate financial performance (cluster #2, #3, #5).

3.2.2 Author co-citation network

This section illustrates the number of times the author was cited. As shown in Figure 7, this network consists of 254 nodes and 413 links, reflecting the indirect partnership formed by common references. Therefore, the top five citation authors are: Michael E. Porter (f = 432, UK), Stuart L Hart (f = 342, USA), Pratima (Tima) Bansal (f = 302, Canada), Sanjay Sharma (f = 282, USA), and Abagail McWilliams (f = 243, USA). Those authors' nationalities illustrated that articles on social responsibility and environmental issues areas had received widespread attention in the US, the UK, and Canada.
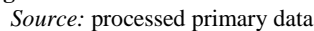
Figure 7. Author co-citation network
Source: processed primary data

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810
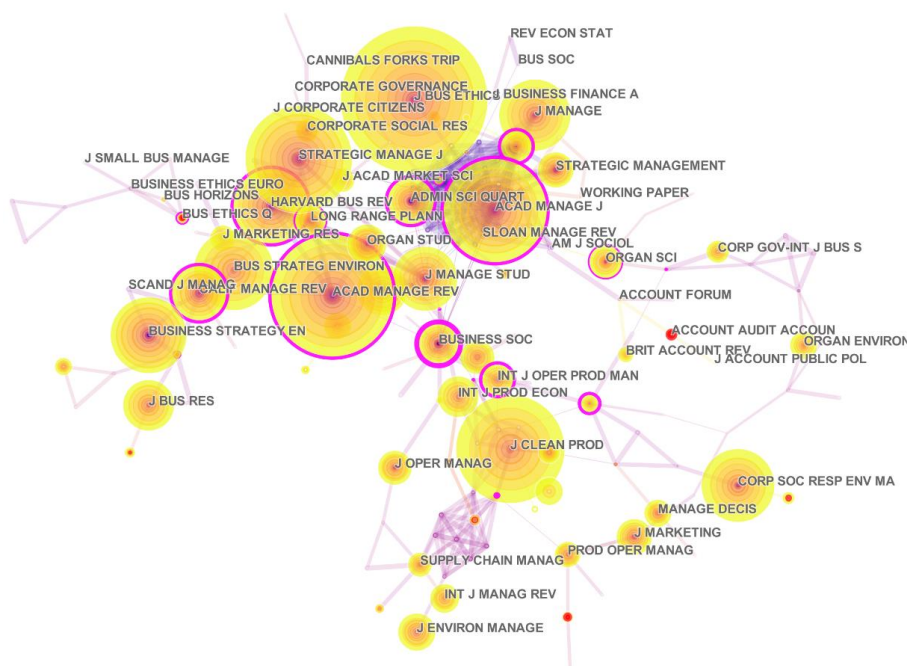
3.2.3 Journal co-citation network

There are 184 various journals in Figure 8, revealing that research on social responsibility and environmental issues covers various fields. The nodes' large size means more co-citation frequency, and nodes with purple color edges represent the journal's centrality. A journal with high centrality shows the importance of that journal, and articles from that journal cover a wider span. Table 3 shows the top 10 co-citation journals and the percentage of co-citation frequency among total co-citation frequency. Additionally, we found 55 burst journals. Those articles from these journals have received a large amount of attention in a short period. The top five are: Journal of Environmental Economics and Management (burst = 24.36, 2003 to 2015), Social Responsibility Journal (burst = 20.42, 2018 to 2020, UK), British Journal of Management (burst = 20.33, 2013 to 2017), Accounting, Auditing & Accountability Journal (burst = 17.81, 2016 to 2020), and Journal of Economic Perspectives (burst = 17.41, 2008 to 2014).

Table 3. Top 10 journals with highest co-citation frequency

No.	Co-citation frequency	Journal Name	Percent (%)
1	951	J BUS ETHICS	5.5%
2	801	ACAD MANAGE REV	4.7%
3	708	STRATEGIC MANAGE J	4.1%
4	707	J CLEAN PROD	4.1%
5	694	ACAD MANAGE J	4.0%
6	539	BUS STRATEG ENVIRON	3.1%
7	506	HARVARD BUS REV	2.9%
8	503	BUSINESS STRATEGY EN	2.9%
9	484	J MANAGE	2.8%
10	458	J MANAGE STUD	2.7%

Source: processed primary data

Figure 8. Journal co-citation network
Source: processed primary data

Conclusions

Based on 1,336 records related to environmental issues and social responsibility through subject category co-occurrence analysis, keyword co-occurrence, author, journal, and document co-citation analysis, this study analyzed the current situation and development trend of this field. The emergence of environmental issues has brought a series of research problems and substantive problems to experts, scholars, and even entrepreneurs. With the development of the economy and the increasingly severe environmental issues, maintaining a relatively balanced growth in this ecosystem has become a hot topic. According to the finding from this research, we articulate that the research field of environmental issues and social responsibility maintain a hot topic and is continually emerging. Meanwhile, research related to social responsibility has been catching significant attention from academia and empirical practice.

Firstly, several research subjects related to business & economics, environmental sciences & ecology, management, business, environmental studies, and science & technology acquired the most documentation. Secondly, through the keyword co-occurrence network and burstiness analysis, and through the analysis of co-occurrence and emergence of keywords, this research has found a shift in the research paradigm in this field, from focusing on a single level of environmental issues to emphasizing broad organizational strategies, and from an individual or even government-centric perspective to a wide range of organizations and stakeholders and even the entire ecological perspective. Besides, we found that a sustainable supply chain may assist in this balancing act, but much research is needed.

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Although we have the advantages of the assorted procedure described above, our research still has several challenges. Firstly, using the Web of Science database might lead to some missing points in the analysis. Scopus is another reliable database that is advised to use another database when improving this type of research in the future. Secondly, even though the 1,336 papers identified by co-occurrence analysis used Scientometric method to classify topics, the topic coverage of the identified papers may depend mainly on the authors' subjective judgment.

In future studies, there are three directions that we recommended. Firstly, the guide refers to stakeholder participation in environmental issues from a systematic viewpoint. Secondly, the direction on establishing a social-responsibility-based framework and embedded in supply chain management and sustainability. Thirdly, the direction of environmental strategy, from the meso view, is significant for corporates to estimating and planning the strategy under a particular context. The context could be either a country or a specific area. In addition, the most important and essential rule is legitimacy, followed by other social responsibility aspects to support local development and environmentally friendly equilibration. From the macro perspective, the system's improvement on social and environmental/ecology will promote economic development sustainability since the environment is not the only barrier of development. Therefore, institutional differences and mechanism gaps under diverse social circumstances and environmental contexts are worth exploring.

References

Aguinis, H., & Glavas, A. (2012). What We Know and Don't Know About Corporate Social Responsibility: A Review and Research Agenda. *Journal of management, 38*(4), 932-968. https://doi.org/10.1177/0149206311436079

Aragón-Correa, J. A., Hurtado-Torres, N., Sharma, S., & García-Morales, V. J. (2008). Environmental strategy and performance in small firms: A resource-based perspective. *Journal of environmental management, 86*(1), 88-103. https://doi.org/https://doi.org/10.1016/j.jenvman.2006.11.022

Bansal, P. (2005). Evolving sustainably: A longitudinal study of corporate sustainable development. *Strategic management journal, 26*(3), 197-218. https://doi.org/10.1002/smj.441

Bravi, L., Santos, G., Pagano, A., & Murmura, F. (2020). Environmental management system according to ISO 14001:2015 as a driver to sustainable development. *Corporate Social Responsibility and Environmental Management, n/a*(n/a). https://doi.org/10.1002/csr.1985

Buysse, K., & Verbeke, A. (2003). Proactive environmental strategies: A stakeholder management perspective. *Strategic management journal, 24*(5), 453-470. https://doi.org/10.1002/smj.299

Carroll, A. B. (1979). A Three-Dimensional Conceptual Model of Corporate Performance. *Academy of management review, 4*(4), 497-505. https://doi.org/10.5465/amr.1979.4498296

Carroll, A. B. (1999). Corporate Social Responsibility: Evolution of a Definitional Construct. *Business & society, 38*(3), 268-295. https://doi.org/10.1177/000765039903800303

Carroll, A. B., & Shabana, K. M. (2010). The business case for corporate social responsibility: A review of concepts, research and practice. *International journal of management reviews, 12*(1), 85-105. https://doi.org/10.1111/j.1468-2370.2009.00275.x

Carter Craig, R., & Liane Easton, P. (2011). Sustainable supply chain management: evolution and future directions. *International journal of physical distribution & logistics management, 41*(1), 46-62. https://doi.org/10.1108/09600031111101420

Carter Craig, R., & Rogers Dale, S. (2008). A framework of sustainable supply chain management: moving toward new theory. *International journal of physical distribution & logistics management, 38*(5), 360-387. https://doi.org/10.1108/09600030810882816

Chaomei, C. (2017). Science Mapping: A Systematic Review of the Literature. *Journal of Data and Information Science, 2*(2), 1-40. https://doi.org/https://doi.org/10.1515/jdis-2017-0006

Chen, C. (2006). CiteSpace II: Detecting and visualizing emerging trends and transient patterns in scientific literature. *Journal of the American Society for information Science and Technology, 57*(3), 359-377. https://doi.org/10.1002/asi.20317

Chen, Y., Chen, C., Luan, C., hu, Z., & Wang, X. (2015). CiteSpace 知识图谱的方法论功能 (The methodology function of CiteSpace mapping knowledge domains). 科学学研究 *(Studies in Science of Science), 33*, 242-253. https://doi.org/10.16192/j.cnki.1003-2053.2015.02.009

Cheng, B., Ioannou, I., & Serafeim, G. (2014). Corporate social responsibility and access to finance. *Strategic management journal, 35*(1), 1-23. https://doi.org/10.1002/smj.2131

Cismas, L.M., Miculescu, A., Negrut, L., Negrut, V., Otil, M.D. & Vadasan, I. (2019). Social Capital, Social Responsibility, Economic Behavior and Sustainable Economic Development – An Analysis of Romania's Situation. *Transformations in Business & Economics*, *18*, No 2A (47A), pp.605-627.

Cochran, P. L., & Wood, R. A. (1984). Corporate Social Responsibility and Financial Performance. *Academy of management Journal, 27*(1), 42-56. https://doi.org/10.5465/255956

Cowell, R. (1997). Stretching the Limits: Environmental Compensation, Habitat Creation and Sustainable Development. *Transactions of the Institute of British Geographers, 22*(3), 292-306. https://doi.org/10.1111/j.0020-2754.1997.00292.x

Darnall, N., Henriques, I., & Sadorsky, P. (2010). Adopting Proactive Environmental Strategy: The Influence of Stakeholders and Firm Size. *Journal of management studies, 47*(6), 1072-1094. https://doi.org/10.1111/j.1467-6486.2009.00873.x

Dixon-Fowler, H. R., Slater, D. J., Johnson, J. L., Ellstrand, A. E., & Romi, A. M. (2013). Beyond "does it pay to be green?" A meta-analysis of moderators of the CEP–CFP relationship. *Journal of Business ethics, 112*(2), 353-366. https://doi.org/10.1007/s10551-012-1268-8

Eccles, R. G., Ioannou, I., & Serafeim, G. (2014). The Impact of Corporate Sustainability on Organizational Processes and Performance. *Management Science, 60*(11), 2835-2857. https://doi.org/10.1287/mnsc.2014.1984

Edge, D. (1979). Quantitative Measures of Communication in Science: A Critical Review. *History of science, 17*(2), 102-134. https://doi.org/10.1177/007327537901700202

Fang, Y., Yin, J., & Wu, B. (2018). Climate change and tourism: a scientometric analysis using CiteSpace. *Journal of Sustainable Tourism, 26*(1), 108-126. https://doi.org/10.1080/09669582.2017.1329310

Fernández, E., Junquera, B., & Ordiz, M. (2003). Organizational culture and human resources in the environmental issue: a review of the literature. *The International Journal of Human Resource Management, 14*(4), 634-656. https://doi.org/10.1080/0958519032000057628

Flammer, C. (2012). Corporate Social Responsibility and Shareholder Reaction: The Environmental Awareness of Investors. *Academy of management Journal, 56*(3), 758-781. https://doi.org/10.5465/amj.2011.0744

Flyvbjerg, B. (2014). What you Should Know about Megaprojects and Why: An Overview. *Project Management Journal, 45*(2), 6-19. https://doi.org/10.1002/pmj.21409

Gimenez, C., Sierra, V., & Rodon, J. (2012). Sustainable operations: Their impact on the triple bottom line. *International journal of production economics, 140*(1), 149-159. https://doi.org/https://doi.org/10.1016/j.ijpe.2012.01.035

Hart, S. L. (1995). A Natural-Resource-Based View of the Firm. *Academy of management review, 20*(4), 986-1014. https://doi.org/10.5465/amr.1995.9512280033

He, Q., et al. (2019). Managing social responsibility for sustainability in megaprojects: An innovation transitions perspective on success. *Journal of Cleaner Production, 241*, 118395. https://doi.org/https://doi.org/10.1016/j.jclepro.2019.118395

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

He, Q., Wang, G., Luo, L., Shi, Q., Xie, J., & Meng, X. (2017). Mapping the managerial areas of Building Information Modeling (BIM) using scientometric analysis. *International Journal of Project Management, 35*(4), 670-685. https://doi.org/https://doi.org/10.1016/j.ijproman.2016.08.001

Helfaya, A., & Moussa, T. (2017). Do Board's Corporate Social Responsibility Strategy and Orientation Influence Environmental Sustainability Disclosure? UK Evidence. *Business Strategy and the Environment, 26*(8), 1061-1077. https://doi.org/10.1002/bse.1960

Hillman, A. J., & Keim, G. D. (2001). Shareholder value, stakeholder management, and social issues: what's the bottom line? *Strategic management journal, 22*(2), 125-139. https://doi.org/10.1002/1097-0266(200101)22:2<125::AID-SMJ150>3.0.CO;2-H

Hsin-Ning, S., & Pei-Chun, L. (2010). Mapping knowledge structure by keyword co-occurrence: a first look at journal papers in Technology Foresight. *Scientometrics, 85*(1), 65-79. https://doi.org/10.1007/s11192-010-0259-8

Husni, H. (2020). The effectiveness of the social responsibility program for Islamic religious education through the participatory action research method. *The Social Studies: An International Journal, 6*(1), 103-116. Retrieved from http://fssh-journal.org/index.php/scr/article/view/107

Husaini; Pirzada, K., Saiful, 2020. Risk Management, Sustainable Governance Impact on Corporate Performance. *Journal of Security and Sustainability Issues*, 9(3), 993-1004. https://doi.org/10.9770/jssi.2020.9.3(23)

Ji, Z., Li, P. & Zheng, X. (2019). Manufacturing Agglomeration and Environmental Efficiency in China: Insights from the Panel Threshold Model. *Transformations In Business & Economics*, *18*, No 1 (46), 257-277.

Khan, S., Maqbool, A., Haleem, A., & Khan Mohd, I. (2020). Analyzing critical success factors for a successful transition towards circular economy through DANP approach. *Management of Environmental Quality: An International Journal*, *31*(3), 505-529. https://www.emerald.com/insight/content/doi/10.1108/MEQ-09-2019-0191/full/html

Kolk, A. (2016). The social responsibility of international business: From ethics and the environment to CSR and sustainable development. *Journal of World Business, 51*(1), 23-34. https://doi.org/10.1016/j.jwb.2015.08.010

Liao, L., Luo, L., & Tang, Q. (2015). Gender diversity, board independence, environmental committee and greenhouse gas disclosure. *The British Accounting Review, 47*(4), 409-424. https://doi.org/https://doi.org/10.1016/j.bar.2014.01.002

Liu, J., Yuan, C., Hafeez, M., & Li, X. (2020). ISO 14001 certification in developing countries: motivations from trade and environment. *Journal of Environmental Planning and Management, 63*(7), 1241-1265. https://doi.org/10.1080/09640568.2019.1649642

Liu, W., Tang, L., & Hu, G. (2020). Funding information in Web of Science: an updated overview. *Scientometrics, 122*(3), 1509-1524. https://doi.org/10.1007/s11192-020-03362-3

Margolis, J. D., Elfenbein, H. A., & Walsh, J. P. (2007). Does it pay to be good? A meta-analysis and redirection of research on the relationship between corporate social and financial performance. *Ann Arbor, 1001*, 48109-41234. https://doi.org/10.2139/ssrn.1866371

Matten, D., & Moon, J. (2008). "Implicit" and "Explicit" CSR: A Conceptual Framework for a Comparative Understanding of Corporate Social Responsibility. *Academy of management review, 33*(2), 404-424. https://doi.org/10.5465/amr.2008.31193458

Mazzoni, F. (2020). Circular economy and eco-innovation in Italian industrial clusters. Best practices from Prato textile cluster. *Insights into Regional Development*, *2*(3), 661-676. https://doi.org/10.9770/IRD.2020.2.3(4)

McGuire, J. B., Sundgren, A., & Schneeweis, T. (1988). Corporate Social Responsibility and Firm Financial Performance. *Academy of management Journal, 31*(4), 854-872. https://doi.org/10.5465/256342

McWilliams, A., & Siegel, D. (2000). Corporate social responsibility and financial performance: correlation or misspecification? *Strategic management journal, 21*(5), 603-609. https://doi.org/10.1002/(SICI)1097-0266(200005)21:5<603::AID-SMJ101>3.0.CO;2-3

McWilliams, A., Siegel, D. S., & Wright, P. M. (2006). Corporate Social Responsibility: Strategic Implications. *Journal of management studies, 43*(1), 1-18. https://doi.org/10.1111/j.1467-6486.2006.00580.x

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Orlitzky, M., Schmidt, F. L., & Rynes, S. L. (2003). Corporate Social and Financial Performance: A Meta-Analysis. *Organization studies, 24*(3), 403-441. https://doi.org/10.1177/0170840603024003910

Orlitzky, M., Siegel, D. S., & Waldman, D. A. (2011). Strategic corporate social responsibility and environmental sustainability. *Business & Society, 50*(1), 6-27. https://doi.org/10.1177/0007650310394323

Özmen Uysal, Ö. (2010). Business Ethics Research with an Accounting Focus: A Bibliometric Analysis from 1988 to 2007. *Journal of Business Ethics, 93*(1), 137-160. https://doi.org/10.1007/s10551-009-0187-9

Peters, W. (1993). Use of methods and evaluation systems of the impact mitigation principle in German EIA. *Journal of Environmental Impact Assessment, 2*(2), 49-53. https://www.koreascience.or.kr/article/JAKO199328062536624.pdf

Porter, M. E. *The Competitive Advantage: Creating and Sustaining Superior Performance*. NY: Free Press, 1985. (Republished with a new introduction, 1998.)

Porter, M. E., & Kramer, M. R. (2006). The link between competitive advantage and corporate social responsibility. *Harvard business review, 84*(12), 78-92. https://hbr.org/2006/12/strategy-and-society-the-link-between-competitive-advantage-and-corporate-social-responsibility

Reinhardt, F. L. (1998). Environmental Product Differentiation: Implications for Corporate Strategy. *California management review, 40*(4), 43-73. https://doi.org/10.2307/41165964

Reinhardt, F. L., & Stavins, R. N. (2010). Corporate social responsibility, business strategy, and the environment. *Oxford Review of Economic Policy, 26*(2), 164-181. https://doi.org/10.1093/oxrep/grq008

Rudyanto, A. & Pirzada, K. 2020. The role of sustainability reporting in shareholder perception of tax avoidance. *Social Responsibility Journal*, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/SRJ-01-2020-0022

Sarkis, J., Gonzalez-Torre, P., & Adenso-Diaz, B. (2010). Stakeholder pressure and the adoption of environmental practices: The mediating effect of training. *Journal of operations Management, 28*(2), 163-176. https://doi.org/https://doi.org/10.1016/j.jom.2009.10.001

Seuring, S., & Müller, M. (2008). From a literature review to a conceptual framework for sustainable supply chain management. *Journal of Cleaner Production, 16*(15), 1699-1710. https://doi.org/https://doi.org/10.1016/j.jclepro.2008.04.020

Sharma, S., & Henriques, I. (2005). Stakeholder influences on sustainability practices in the Canadian forest products industry. *Strategic management journal, 26*(2), 159-180. https://doi.org/10.1002/smj.439

Shaukat, A., Qiu, Y., & Trojanowski, G. (2016). Board Attributes, Corporate Social Responsibility Strategy, and Corporate Environmental and Social Performance. *Journal of Business Ethics, 135*(3), 569-585. https://doi.org/10.1007/s10551-014-2460-9

Small, H. (1973). Co-citation in the scientific literature: A new measure of the relationship between two documents. *Journal of the American Society for information Science, 24*(4), 265-269. https://doi.org/10.1002/asi.4630240406

Stefan, A., & Paul, L. (2008). Does It Pay to Be Green? A Systematic Overview. *Academy of Management Perspectives, 22*(4), 45-62. https://doi.org/10.5465/amp.2008.35590353

Surroca, J., Tribó, J. A., & Waddock, S. (2010). Corporate responsibility and financial performance: the role of intangible resources. *Strategic management journal, 31*(5), 463-490. https://doi.org/10.1002/smj.820

Tvaronavičienė, M., & Ślusarczyk, B. (2019). Energy transformation towards sustainability. Energy transformation towards sustainability (pp. 1-333) https://doi.org/10.1016/C2018-0-02510-4 Retrieved from www.scopus.com

Vachon, S., & Klassen, R. D. (2008). Environmental management and manufacturing performance: The role of collaboration in the supply chain. *International journal of production economics, 111*(2), 299-315. https://doi.org/https://doi.org/10.1016/j.ijpe.2006.11.030

Vanraan, A. F. J. (1990). Fractal dimension of co-citations. *Nature, 347*(6294), 626-626. https://doi.org/10.1038/347626a0

Make your research more visible, join the Twitter account of ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES: @Entrepr69728810

Wang, L., Xue, X., Zhao, Z., & Wang, Z. (2018). The Impacts of Transportation Infrastructure on Sustainable Development: Emerging Trends and Challenges. *International journal of environmental research and public health, 15*(6), 1172. https://doi.org/10.3390/ijerph15061172

Ye, N., Kueh, T.-B., Hou, L., Liu, Y., & Yu, H. (2020). A bibliometric analysis of corporate social responsibility in sustainable development. *Journal of Cleaner Production, 272*, 122679. https://doi.org/https://doi.org/10.1016/j.jclepro.2020.122679

Yeganeh Kia, H. (2020). A typology of sources, manifestations, and implications of environmental degradation. *Management of Environmental Quality: An International Journal*, *31*(3), 765-783. https://www.emerald.com/insight/content/doi/10.1108/MEQ-02-2019-0036/full/html

Zeng, S. X., Ma, H. Y., Lin, H., Zeng, R. C., & Tam, V. W. Y. (2015). Social responsibility of major infrastructure projects in China. *International Journal of Project Management, 33*(3), 537-548. https://doi.org/https://doi.org/10.1016/j.ijproman.2014.07.007

Zhao, X., Zuo, J., Wu, G., & Huang, C. (2019). A bibliometric review of green building research 2000–2016. *Architectural Science Review, 62*(1), 74-88. https://doi.org/10.1080/00038628.2018.1485548

Zhu, J., & Liu, W. (2020). A tale of two databases: the use of Web of Science and Scopus in academic papers. *Scientometrics, 123*(1), 321-335. https://doi.org/10.1007/s11192-020-03387-8

Acknowledgements

Zixuan ZENG is the PhD candidate in Faculty of Logistics and Supply Chain, Naresuan University, Thailand. A lecturer in Faculty of Management Science and Engineering, Guangxi University of Finance and Economics, China. Research interests: strategy; innovation; firm internationalization; sustainability.
ORCID ID: https://orcid.org/0000-0002-1439-5520

Thammanoon HENGSADEKUL, is the lecturer in Faculty of Logistics and Supply Chain, Naresuan University, Thailand. A PhD in Asian Institute of Technology. Research field: project management and construction management, real estate management, family business management; transportation.
ORCID ID: https://orcid.org/0000-0001-8049-5821